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I X.

Diagnostic Characters of New Species of Phænogamous Plants, collected in Japan by CHARLES WRIGHT, Botanist of the U. S. North Pacific Exploring Expedition. (Published by Request of CAPTAIN JOHN RODGERS, Commander of the Expedition.) With Observations upon the Relations of the Japanese Flora to that of North America, and of other Parts of the Northern Temperate Zone.

By ASA GRAY, M. D.

(Read December 14, 1858, and January 11, 1859.)

THE dried plants collected during the visit of the Expedition, commanded by Captain John Rodgers, to different parts of Japan, were intrusted to me by Mr. Wright for examination; and I have prepared a detailed account of them, intended to form a part of Mr. Wright's general report upon the extensive and interesting botanical collections made by him during the whole cruise of the Expedition. As this report, and that of the important scientific results of this Expedition in various other departments, may not be published for some time, I am permitted and requested, by the Commander of the Expedition, — ever considerate of the interests of science, — briefly to make known the principal novelties which have been discovered in this field. The discoveries in this case are by no means limited to the detection of entirely new species (in which, however, the collection will be seen to abound), but also relate to the detection of known species in a region where they were not known before, and to the identification and elucidation of many obscure species. It will be best, therefore, to take a cursory general notice of the more interesting plants of this collection, adding any remarks which it may be worth while now to make upon their geographical distribution or their characters, and appending the diagnoses of new genera and species in the form of foot-notes.

It should be mentioned that the botanical collections made at Ousima, Katonasisima,

&c., — lying as these islands do nearest to the Loo Choo Islands, — have been deemed to belong to the Loo Choo, rather than to the proper Japan Flora. Consequently the present Japan collection is of a strictly temperate character, excepting a small number of plants gathered (between December 29th and January 3d) on the shore of Kago-sima Bay, at the southern end of Kiu-siu, and a few picked up on Tanega Island (lat. $30^{\circ} 32' 44''$) January 9th. The principal collections were made at Simoda (lat. $34^{\circ} 40'$) in May; and at Hakodadi (lat. $41^{\circ} 47' 11''$) in June, 1855; where also were previously gathered the plants of the small collection communicated to me by Drs. Williams and Morrow, of which I published a short account in the second volume of the Narrative of the Japan Expedition commanded by the late Commodore Perry, Moreover, a scanty but invaluable collection of plants was gathered by Mr. J. Small, who was detailed as the Botanist's assistant, during the cruise of the small steamer to which he was attached, through the Straits of Sangar, touching upon both shores; thence along the west coast of Jesso, touching at Slope Point and Iwanai (between lat. 42° and 43°), to Capes Romanzoff and Soya (lat. $45^{\circ} 30'$), the northern extremity of Jesso, — a district entirely new to the botanist, and of unsurpassed interest.

This remark may indeed be extended, most emphatically, to all the northern Japanese islands. The reason why their vegetation is so remarkably interesting to the American botanist will appear in the sequel.

Among the *Ranunculaceæ* we have *Clematis patens*, Morr. & Decaisne (Lindley's *C. cærulea*), and Thunberg's *C. Japonica*, which proves to belong to the section *Cheiropsis*. It is doubtless Thunberg's plant, and probably Zuccarini's, although he does not mention the bractlets on the peduncle (above the middle), and the filaments are but sparsely hirsute above, and wholly glabrous below. The sepals appear to be thicker than in other species of the section. The relatives of this and of my *C. Williamsii* (which has not been a second time collected) are Himalayan species. None of those species were collected which in Japan represent our Eastern American *C. Virginiana*. *Thalictrum Thunbergii* has yellow flowers; otherwise it is very near *T. Kemense*, which Dr. Hooker reduces to *T. majus*, and then both to *T. minus*.

Besides *Ranunculus ternatus*, Thunb., which is not very different from some forms of *R. repens*, Mr. Wright gathered *R. repens* itself, the larger forms of the American type, *R. sceleratus*, and *R. propinquus* var. *hirsutus*, a Siberian plant nearly allied to *R. acris*.

Caltha palustris, in various forms, abounds at Hakodadi, as throughout the northern temperate zone; but the *Trollius* so like our American species, if not identical with it,

also *Coptis trifolia*, and the two new species characterized by Zuccarini, — one of which appears to be the Northwest American *C. asplenifolia*, and the other a representative of Nuttall's *C. occidentalis*, — as also Zuccarini's genus *Anemonopsis*, unfortunately were not met with.

I may remark that Zuccarini's *Isopyrum Japonicum* is clearly *I. adoxoides*, DC. It is not so nearly related to the Californian *I. occidentale* as our Eastern American *I. biter-natum* is to the European *I. thalictroides*.

The *Aquilegia flabellata* is apparently a cultivated plant. I have never seen *A. Burgeriana*, Sieb. & Zucc.; but it seems to be the Japanese form of *A. Canadensis*, which stretches across the New World from the Atlantic coast to Kamtschatka. *Anemone Pennsylvanica*, Linn., is in similar case, but has penetrated well into Siberia; it is enumerated by Thunberg as a Japanese plant, probably correctly.

Actea spicata is now for the first time found in Japan, both with slender and with thickish pedicels; the color of the berries not recorded. There are indications of *Cimicifuga fœtida* in Japan, — a species which extends from Oregon westward to Russia in Europe, while it is represented on our Alleghany Mountains by the too closely allied *C. Americana*. A different and more peculiar case of representation occurs in this group, *Cimicifuga (Macrotys) racemosa* and *cordifolia*, peculiar to North America east of the Mississippi, being plainly represented by Zuccarini's three species of *Pityrosperma* (one of them *Actea Japonica* of Thunberg). Siebold also found a *Trautvetteria* in Japan; which, from the brief characters mentioned, seems not to differ from our own Alleghanian *T. palmata*, already identified on the Okotsk coast, and also (as *T. grandis*, Nutt., but with no marks to distinguish it from the Eastern plant) in Oregon and on the island of Kodiak, — close under the long peninsula of Ailaska, which points to Japan, and is in fact almost connected with it and with Kamtschatka by means of the Aleutian and the Kurile Islands.

Our collection contains specimens of *Glaucidium palmatum*, Sieb. & Zucc., with young fruit, and so affords the means for nearly completing the characters of this remarkable genus. The floral envelopes (lilac or pinkish) are evidently simple, calycine, and early deciduous; the anthers of the normal sort. But the remarkable point now brought to light is, that there are often two or three pistils, more or less connate at their bases, apparently follicular and above widely divergent in fruit, and containing numerous seeds in several ranks. The immature seeds are oval, flat, thin, and broadly winged except at the hilum. The number of pistils, as now revealed, excludes the idea of a relationship with *Podophyllum* and *Diphylleia*, which the foliage suggests. Zuccarini has rightly referred the genus to the Ranunculaceæ. It belongs,

however, not to the tribe *Pæoniæ*, but to the *Cimicifugeæ*, and in my opinion its nearest relative is the Alleghanian genus *Hydrastis*.

On the other hand, the *Pæonia* found in Japan, wild near Hakodadi, is a European type, and even a European species. In America this genus barely finds a place, in a well-marked species, upon the mountains of the western coast, from Northern Oregon to California.

Of the *Magnoliaceæ* (taken in the widest sense) — a type absent from Europe, and equally so from all Western North America — there are about as many Japanese species known as there are in Eastern America; and all the suborders are represented in both. *Illicium religiosum* of Japan is the counterpart of our two Floridian and Georgian species; the Japanese Magnolias (of which Mr. Wright collected only *M. hypoleuca*, the blossoms of which he records as exhaling the odor of Gaultheria) are not very close representatives of United States species, and there is also an allied genus *Burgeria*; and both *Kadsura* and *Sphærostema* in Japan represent our monotypic *Schizandra*. Indeed, a species which I have now to make known * (unfortunately from the male plant only) would certainly have been referred to *Schizandra* if the polyandrous species had remained undiscovered, although it is clearly a *Sphærostema* of the section "*filamentis basi monadelphis apice liberis*," with the andrœcium reduced to five stamens. *Schizandra* is the corresponding analogue of the other section of *Sphærostema*, with thickened stamens bearing disjoined anther-cells, also reduced to five.

Of the *Lardizabaleæ* only an *Akebia* was collected. The American representatives of this small order are in the western part of South America; the rest are Himalayan.

Of *Menispermaceæ*, also an extra-European order, only a *Stephania*, apparently *S. hernandifolia*, was gathered, at the southern end of Kiu-siu. It is probably Thunberg's *Menispermum Japonicum*.

Berberidaceæ. We have both the true *Berberis vulgaris* and *B. Thunbergii*, DC., the latter very near *B. Cretica*, and accordingly hardly distinguishable from our own Alleghanian *B. Canadensis*. The Japan *Mahonia*, a link between the Western American and Himalayan species, I have not seen. Nor was a single *Epimedium* collected, although Japan is apparently the focus of the genus. But perhaps the most interesting and most unexpected discovery of the expedition is that of two strictly Eastern North American species of this order, — each the sole representative of their genus, — viz. *Caulophyllum thalictroides*, and *Diphylleia cymosa*, of Michaux. The former was gath-

* SPHÆROSTEMA JAPONICUM: foliis omnino *Schizandræ coccineæ*; floribus albis; staminibus 5 inæqualiter connatis. Hakodadi. An *S. Japonica*, Sieb. & Zucc., indscript.?

ered near Hakodadi, and also on the northern end of Nippon, — out of blossom, indeed, but with the ovaries just bursting, and the later specimens with the peculiar seed well formed. The latter, J. Small found at Cape Soya, the northeastern extremity of Japan, in fruit only. So that flowers are wanted to confirm the identity, of which, however, I have scarce a doubt. *Caulophyllum* inhabits rich woods, from Canada to the mountains of Carolina and northwest to Minnesota; *Diphylleia* was known only in the Alleghany Mountains between Virginia and Georgia.

Supposing these two plants to be satisfactorily identified as to species, are we to regard them as the descendants of a common stock, though now separated by one hundred and forty degrees of longitude? Or are we to suppose them independently originated in two such widely distant regions? The collocation of a larger body of such facts may lead to a satisfactory answer to these questions.

Nymphæaceæ. Zuccarini mentions two undetermined species of *Nymphæa*. It would no longer be surprising if our *N. odorata* should be one of them. Mr. Wright found only *Nuphar Japonica*, which, in appearance, is intermediate between *N. lutea*, of the northern part of the temperate zone generally, and the very local *N. sagittæfolia* of the Southeastern United States.

Of true *Papaveraceæ* none seem to be indigenous to Japan, except *Chelidonium*.

But *Fumariaceæ* are rather numerous. Mr. Wright gathered three of the seven species of *Corydalis* enumerated by Zuccarini, and the *Dicentra spectabilis*, now so well known in our gardens. *Dicentra pusilla*, Sieb. & Zucc., is likely to be the *D. lachena-liæflora*, which was collected in the adjacent Okotsk region.

Besides *Arabis hirsuta* and *A. lyrata*, Mr. Wright abundantly gathered the plant which in Perry's Japan Expedition I called *A. alpina*? var. *Japonica*, but now consider distinct.* The few other *Cruciferae*, all Old-World species, had been already recorded as from Japan.

Having barely touched upon the southern island, Kiu-siu, Mr. Wright did not meet with the interesting Flacourtiaceous plant *Xylosma* (*Hisingera*) *Japonicum*, the congeners of which are mostly in the South Sea Islands and in Central America, &c.†

* *ARABIS JAPONICA* (sp. nov.): pubescens; caule valido folioso (spithamæo ad pedalem); foliis dentatis, radicalibus obovatis oblongisve in petiolum attenuatis, caulinis ovatis oblongisve subcordato-amplexicaulibus; racemo densifloro; siliquis etiam confertis erectis strictis, valvis subplanis nervosis; stylo brevissimo; seminibus anguste alatis (vel apteris?). Hakodadi and Simoda.

† M. Clos, in his recent monograph of the *Flacourtiaceæ* (Ann. Sci. Nat. ser. 4, 8. p. 220, 227, &c.), recognizes the general identity of *Hisingera* with *Xylosma*, but keeps up the latter genus on account of the more united styles and stigmas, — a difference only of degree and with no marked limitation. He takes no notice

Violarieæ. Among the Violets of the collection are specimens, which (although in fruit) may be safely referred to *V. imberbis* of Ledebour, which appears to me identical with *V. umbrosa* of Fries, and with *V. Selkirkii* of Pursh. The latter name has the priority. Perhaps the *V. Kamtschatica* of Gingins is not different. *V. Patrinii* reminds us of our own *V. primulæfolia*. *V. sylvatica* of Fries (*V. canina*, Smith, &c.) is represented by a beardless variety.* Both this species and the true Linnæan *V. canina* (as understood by Fries, &c.) are wanting in America; where *V. striata* and *V. Muhlenbergii* are their representatives on the eastern side of the continent. On the western side *V. adunca* more nearly answers (in general appearance, at least) to *V. arenaria* and *V. pumila* of the Old World. My *V. laciniosa*, also an analogue of *V. striata*, but with blue flowers, occurs again, generally less stout, and with less foliaceous stipules, than the specimens upon which the species was founded. Finally, there is a new species (of which I had before a specimen too imperfect for description), which in aspect and in character is intermediate between *V. biflora* of the Old World and *V. Canadensis* of the New, but with nearly the stigma of the former.†

Some foliage of *Drosera rotundifolia* serves to show that this genus is not wanting to Japan.

Of *Caryophyllaceæ*, besides *Dianthus Japonicus* and *D. superbus*, we have the oblong-leaved form of *Honkenya*, like that of Oregon, *Mæhringia lateriflora*, and good specimens of the plant detected by Williams and Morrow, which I had mentioned under *Mæhringia*, but must now refer to *Sagina*.‡ It is the largest species of that genus. Also *Stellaria uliginosa*, answering to Thunberg's *S. undulata*, and resembling *S. crispa* of Northwestern America, *Malachium aquaticum*, &c.

of the description and figure I had published of both Forster's *Xylosma*, but describes three additional Oceanic species, two of which must belong to the original *X. suaveolens*, from which even *X. orbiculatum* is probably not distinct.

* *VIOLA SYLVATICA*, Fries, var. *IMBERBIS*: stipulis magis laciniato-pectinatis, caulinis haud raro petiolum subæquantibus; petalis imberbibus; stigmatibus minus recurvo. — Forma *MACRANTHA* (*V. Riviniana*, Reich. analogæ). Hakodadi. Forma *MICRANTHA*. Simoda.

† *VIOLA VERECUNDA* (sp. nov.): glabra; caulibus e rhizomate repente? gracilibus erectis vel adsurgentibus folia 3 vel 4 reniformi-cordata gerentibus; stipulis lanceolatis spatulatisve basi vel uno latere parce dentatis; sepalis lanceolatis; corolla albida nunc purpureo-venosa imberbi; calcare brevissimo saccato; stigmatibus bilobo glabro. Hakodadi.

‡ *SAGINA MAXIMA* (sp. nov.): annua? cæspitans; caulibus elongatis spithamæis diffusis paucifloris; foliis linearibus crassiusculis muticis vel mucronulatis; floribus sæpius 5-meris; sepalis late ovatis demum orbiculatis ecarinatis extus cum pedunculo pl. m. glanduloso-hirtellis petala orbiculata capsulamque subæquantibus; staminibus 10 vel 8; stigmatibus brevibus. Hakodadi, Cape Sangar. Var. magis glandulosa: Loo Choo.

It is to be regretted that no *Tilia* were met with. It would be interesting to know whether the two species mentioned by Zuccarini are of the European or the American type. The genus is absent from Western America.

Of *Ternstroëmiaceæ*, *Camelliaceæ*, &c., nothing of any novelty was collected, except that Small obtained, from the very northern extremity of Jesso, a species of *Actinidia*, Lindl. (*Trochostigma*, Sieb. & Zucc., — a genus manifestly related to *Saurauja*), very much like the one which Mr. Wright obtained at the northern Loo Choo Islands (and which is certainly both *T. rufa* and *T. arguta* of Siebold and Zuccarini), but apparently distinct. It needs to be compared with Lindley's original *Actinidia callosa*, of the Himalayas.

Geranium erianthum of Fischer, belonging as it does both to Northeastern Asia and Northwestern America, was a discovery to be expected in Japan. It was found at Hakodadi and elsewhere.

The northern part of Japan also yielded a new *Simarubaceæ*,* which should however be compared with Planchon's *Picrasma ailanthoides*, detected by Bunge in Northern China.

Of *Rutaceæ* there were collected only one of the four Japanese species of *Zanthoxylum*, Thunberg's *Skimmia Japonica* (from the northern end of Jesso), and a plant which, so far as can be told from the fruit, seems to be a new species of the Polynesian genus *Euodia*.†

From Simoda I had formerly received, from Drs. Williams and Morrow, an insufficient specimen of a *Coriaria*. The fine specimens gathered by Mr. Wright show it to be an entirely new species of this peculiar and anomalously distributed genus.‡ Dr. Hooker takes the Himalayan species for a variety of the European (although Wallich's figure looks different enough), as he also identifies the New Zealand species with the common one of the Andes. Besides these, there are indications of a species in Mexico.

* *PICRASMA JAPONICA* (sp. nov.): orgyalis, fere glaber; foliis sæpissime 13 ovatis acuminatis serratis basi abrupta vel subcordata petiolulatis; floribus fertilibus hermaphroditis 5-4-meris pluribus in cyma laxiflora fusco-pubescente. Iwanai, west coast of Jesso.

† *EUODIA RAMIFLORA* (sp. nov.): foliis alternis simplicibus obovato-oblongis seu obovato-cuneatis sæpe acuminatis, petiolo brevi; pedunculis axillaribus brevissimis; carpellis lunatis ad latera striato-reticulatis. Simoda.

‡ *CORIARIA JAPONICA* (sp. nov.): glaberrima; foliis sarmentorum lanceolato-ovatis seu oblongo-ovatis, ramorum florif. orbiculatis; floribus pro genere maximis monœceis; racemis brevibus; filamentis gracillimis. Simoda.

Anacardiaceæ. It is well known that Japanese species of *Rhus* are of the Eastern North American type. From a comparison of specimens, I suspect that Linnæus may have been nearer right than his successors, when he united our Poison Sumach with that of Japan, under the name of *Rhus Vernix*. However that may be, I do not hesitate to refer to our *R. Toxicodendron*, var. *radicans*, specimens, in flower and with young fruit, which Mr. Wright gathered at Hakodadi. Since *R. diversiloba*, Torr. & Gray (*R. lobata*, Hook.), is no more than another form of the same species, this may be said to range from the Atlantic coast of America to Japan.

Vitaceæ. From a similar comparison of specimens, I venture even to refer the *Vitis Labrusca* of Thunberg (*V. Thunbergii*, Sieb. & Zucc.) to the Linnæan species of that name, our own Fox Grape; and I suspect that *V. Indica* and Bunge's *V. ficifolia* are the same thing. This species does not occur in Western America. Nor does *Ampelopsis Virginiana*; but Zuccarini indicates two species of this Eastern American genus in Japan.

Rhamnaceæ. *Berchemia racemosa*, Sieb. & Zucc., represents in Japan the *B. volubilis* of our Southern Atlantic States, as *Rhamnus crenatus*, Sieb. & Zucc. — apparently a *Frangula* — does our *F. Caroliniana*. But the *Rhamnus* which Wright brought from Japan (*R. globosus*, Bunge? Sieb. & Zucc., and *R. Davuricus*, &c.) is probably only a form of the European *R. catharticus*.

Upon the *Aquifoliaceæ*, which are about as numerous in Japan as in the Atlantic United States, there is no remark to make, except to note that the order is wanting in the whole western part of North America.

Celastraceæ. Thunberg has our *Celastrus scandens* (also wanting west of the Mississippi valley) in his Flora of Japan, but afterwards distinguished the plant. The Japanese species, which is probably *C. articulatus*, *punctatus*, and *striatus* of Thunberg, is a close congener of our own *C. scandens*. *Euonymus Japonicus* is of Eastern Asiatic type. Mr. Wright also obtained what appears to be the Himalayan *E. Hamiltonianus* (an analogue of our *E. atropurpureus*, and of the scarcely different *E. occidentalis*, Nutt., the sole representative of the genus in Oregon and California); *E. Sieboldianus*, which is closely allied both to *E. Europæus* and to *E. Americanus*; and a species which appears to be identical with *E. latifolius*, before unknown east of the Caucasian district.

Sapindaceæ. The *Staphylea Bumalda*, which strictly represents both the European and the Eastern North American species, makes however an approach in its fruit to the related Japanese genus, *Euscaphis*. At Hakodadi, on the sides of mountains, *Æsculus turbinata* of Blume was collected. This is a true Horse-Chestnut, although the petals

are only four, and the ovary indicates a smooth fruit. Blume mentions a second Japanese species, which would appear to resemble the *Æ. parviflora* (*Æ. macrostachya*, Michx.) of our Southern United States. I am not at present competent to elucidate the affinities of the numerous Japanese Maples. But *Acer pictum* is apparently an analogue of *A. saccharinum*, and *A. Japonicum* is much like *A. circinatum* of Oregon. I have not seen the *Negundo* mentioned by Siebold and Zuccarini.

Polygala Japonica in habit is similar to *P. Californica*, Nutt. (*P. cucullata*, Benth.), which is probably *P. Nutkana*, DC., and the only species known in Western North America.

Leguminosæ. Mr. Wright's specimens, and other materials, now enable us to circumscribe the characters and the geographical range of *Thermopsis fabacea*, DC. This species extends from the southern extremity of Japan, and even from the islands between it and the Loo Choo group, the shores of the Okotsk Sea, and the Kurile Islands to Oregon, California, and eastward to the Rocky Mountains in New Mexico. It includes the *T. macrophylla*, var. of Torr. & Gray's Flora; and Nuttall's *T. montana* is no more than a variety of it. *T. rhombifolia*, Nutt., east of the Rocky Mountains, if the characters hold, is distinguished by its smaller size, and the recurved, strongly falcate legumes. The real *T. macrophylla*, of Hooker and Arnott, may be known by its woolliness, and by the oblong-lanceolate, very villous legumes, nearly sessile in the calyx. Of this, *T. Caroliniana* of the Southern Alleghanies is the Eastern representative. On the other hand, Japan is the northeastern limit of the European, Himalayan, and Australian *Lotus corniculatus*.

The name of *Astragalus lotoides* is attributed by De Candolle to Lamarck, instead of to Pallas.

Mr. Wright gathered the Siberian *Orobis lathyroides* in the northern part of Japan, in one instance with the seta replaced by a regular terminal leaflet. Also, *Lathyrus palustris*, *L. maritimus*, and the *Vicia*,* which in Perry's Expedition I called *V. Orobis*? It is not that species, however, nor any described one, unless it be Turczaninow's *V. pallida*. The glabrate form much resembles *V. Americana* (which, including *V. Oregana*, Nutt., ranges from the Atlantic to the Pacific), but it wants the conspicuous villous tuft of the stigma.

* *VICIA JAPONICA* (sp. nov.): pedunculis 6-14-floris folia 6-9-juga subæquantibus; foliolis subalternis ellipticis obovatisve obtusissimis vel retusis mucronatis membranaceis nervoso-recticulatis, infimis cauli adproximatis; stipulis semisagittatis parvis; calycis dentibus inæqualibus subulatis brevibus, infimo tubo brevioribus; corolla late purpurea; stylo supra medium æqualiter pilosulo. — Exstant vars. glabella, et molliter pubescens. Simoda, Hakodadi.

In the well-known *Wistaria Sinensis*, which grows wild as far north as Hakodadi, we have a strict representative of *W. frutescens* of the United States east of the Mississippi; while *Milletia Japonica* (*Wistaria Japonica*, Sieb. & Zucc.), found on Kiu-siu, belongs to a more southern Asiatic type.*

None of the Japanese *Lespedeæ* were met with in this expedition. They are of the Siberian and Chinese, rather than of the Eastern American type; and the genus is absent from Western North America, as likewise is *Desmodium*, so abundant in the Atlantic United States, and with one species said to inhabit Japan.

Sophora Japonica is closely related to *S. affinis* of Texas, and to no other known species. I have not seen *S. angustifolia*, Sieb. & Zucc., to compare it with the Siberian *S. flavescens* and *S. alopecuroides* on the one hand, and on the other with *S. sericea* of our high Western plains.

Rosaceæ are much more numerous than Leguminous plants in Japan. *Prunus Mume* is probably the same as *P. Sibirica*, and too near the common Apricot. *P. Pseudo-Cerasus*, Lindl., is the representative of the Himalayan *P. Puddum*, and the European *P. Cerasus*. Imperfect specimens from Hakodadi belong either to the American *P. Virginiana*, or to *P. Padus*, which extends through nearly the whole breadth of the Old World. Not having well-formed fruit, I cannot tell whether the fruit is rugose, as in the latter, or smooth, as in the former. *P. spinulosa* represents, in a general way, our *P. Caroliniana* and the *P. Lauro-Cerasus* of Europe.

Of *Spiræa*, the present collection comprises *S. betulæfolia*, Pall., which extends from Eastern Siberia through Oregon to the eastern base of the Rocky Mountains, and then (under the name of *S. corymbosa*, Raf.) reappears in the Alleghanies of Virginia; *S. palmata* of Thunberg, which is very likely to prove the *S. palmata* of Pallas also (which is very close to the Alleghanian *S. lobata*), and is certainly only a glabrate form of *S. Kamtschatica*; and *S. Aruncus*. The latter extends through the Old World, but is rare in Western Europe, and through the Russian American Islands and Oregon, to the Alleghanies and their northern prolongation. Its petals are convolute in æstivation. No doubt *S. salicifolia* grows in Northern Japan, as well as on the adjacent mainland; this also extends through Asia and crosses the eastern borders of Europe, and reappears in the eastern part of North America, while wanting in the western. But it is replaced in Oregon by *S. Menziesii*.

* Through some oversight, Bentham, in *Plantæ Junghuhnianæ*, p. 249, adn., has enumerated *Wistaria Chinensis* as a *Milletia*. But *W. Japonica* must have been the species intended, as this is truly a *Milletia*, while the other is not.

To this order I should refer *Stephanandra* (obtained with young fruit), along with *Neillia*, as stated in a preceding memoir.

Sanguisorba tenuifolia, Fischer, from the northern end of Jesso, is hardly more than a variety of *S. Canadensis*; the Japanese *Agrimonia* is between true *E. Eupatoria* and *E. pilosa*; *Geum strictum* answers to the American plant; *Potentilla palustris* and *P. Anserina* were both found at Hakodadi; as also a stoloniferous form of *P. fragiformis*, Willd.,* which, however, should be compared with the plant from Eastern Siberia and the Aleutian Islands, the fruit of which has not been described. *P. fragarioides*, Linn., occurs in a large form, at Simoda. Also *P. reptans* (which I had mistaken before for *P. gelida*); and at Hakodadi was gathered a trifoliolate variety of the same. *Fragaria* (*Duchesnia*) *Indica* appears to be indigenous to Japan.

That *Rubus Chamemorus* should be detected at the northern end of Jesso will excite no surprise. Thunberg's *R. palmatus* occurs under numerous forms, one of which is my *R. coptophyllus*. When it was published, I had not seen Thunberg's figure. My *R. hydrastifolius* (not again met with) may be Thunberg's *R. palmatus*. It is uncertain whether the *R. microphyllus* of the younger Linnæus belongs to Thunberg's *R. palmatus*, or to his *R. incisus*. There remain two or three Thunbergian species which I cannot identify. The species of which the characters are subjoined † should be compared with Bunge's *R. crategifolius* from Northern China.

Rosa rugosa, Thunb., abounds on the shore near Hakodadi; it is evidently the *R. ferox* also.

Rhaphiolepis Japonica, Sieb. & Zucc., must include *R. integerrima*, Hook. & Arn., and, as a synonyme, the still older *Mespilus Sieboldii* of Blume (*Photinia Sieboldi*, Don). Apparently it will not be possible to keep separate *Rhaphiolepis rubra* and *R. phæostemon* from *R. Indica*.

Stranvaesia digyna, Sieb. & Zucc., evidently includes Thunberg's *Cratægus villosa* and his *C. lævis*; and the species is a genuine *Photinia* (*P. villosa*, DC.). There are as commonly three styles as two; and the ovary, almost free at the time of flowering,

* *POTENTILLA FRAGIFORMIS*, var. *JAPONICA*: stolonifera; floribus minoribus, carpellis eximie costato-reticulatis. *Fragaria sterilis*, Thunb.? Hakodadi.

† *RUBUS WRIGHTII* (sp. nov.): fruticosus, adscendens, aculeis brevibus recurvis parce armatus; foliis membranaceis subcordato-rotundis sæpius trifidis (summis nunc ovato-lanceolatis subincisis) supra præter venas glabris subtus ramulisque molliter pubescentibus, lobis ovatis seu ovato-lanceolatis duplicato-serratis subincisis; stipulis angustissime linearibus integerrimis; racemo terminali 5-7-floro petiolo brevior; calyce subvillosa, lobis triangulari-ovatis cuspidato-acuminatis petalis obovatis breviter unguiculatis albis patentibus brevioribus. Hakodadi.

has the cells more developed downward during the subsequent growth, so that in fruit only the villous and convex summit of the pericarp is free.

I cannot avoid here interpolating the statement that Mr. Wright found the Californian *Photinia arbutifolia* at the Bonin Islands, along with the *Osteomeles* of the Sandwich Islands. The latter was likewise gathered in the Loo Choo Islands, still nearer to Japan.

Besides *Pyrus spectabilis*, a specimen was gathered at the northern end of Nippon, which appears to be identical with the *P. rivularis* of Oregon. And *Crataegus alnifolia*, Sieb. & Zucc., certainly resembles *C. rivularis* of Oregon. *Pyrus* (*Sorbus*) *gracilis*, Sieb. & Zucc., is very probably the same as *P. sambucifolia*, var. *microphylla*, of Russian America.

Calycanthaceæ consist of three species of *Calycanthus* in the United States east of the Alleghany Mountains, one in California, and one, *Chimonanthus*, in Japan.

Onagraceæ. *Circæa alpina* was gathered at Cape Soya. Zuccarini has a *C. mollis*, probably a mere form of *C. Lutetiana*, which is found nearly round the world, except in Western America.

Grossulaceæ. On Cape Soya, Small gathered *Ribes laxiflorum*, of Northwestern America, which Steller had long ago collected in Eastern Siberia; where also grows *R. nigrum*, of which the American representative is *R. Hudsonianum*. The species of Gooseberry which Thunberg referred to *R. Cynosbati*, of the Northern United States, has not been rediscovered.

Saxifragaceæ. I have not seen the Japanese analogue of the *Mitella pentandra* of Northwestern America, *Mitellopsis Japonica*, Sieb. & Zucc. Nor did the expedition collect any *Astilbe*. Zuccarini's second species, *Hoteia Thunbergii*, if distinct, is certainly a very close representative of our Alleghanian *A. decandra*, since it is said to resemble *Spiræa Aruncus* much more closely than does *A. Japonica*. The other two species of the genus, as is well known, belong to the Himalayas, one species extending to the mountains of Java. The union of the carpels at their base, and with the base of the calyx, are Saxifrageous characters; yet the scarious-dilated bases of the petiole are better apologies for stipules than anything which *Spiræa Aruncus* can show.

One of the most interesting plants of the collection belongs to the present order, and forms the type of a new genus in it, allied to *Astilbe*, and still more to Bunge's little-known *Oresitrophe* from the North of China. I give expression to Mr. Wright's wishes, as well as to my own sentiments, in dedicating this genus to the commander of the expedition, in acknowledgment of the enlightened and generous interest he took in the naturalists of his squadron, and of his constant care to facilitate their explorations.

And the name is the more appropriately conferred upon the present very striking plant, since Captain Rodgers was himself one of its discoverers.*

The plant which in Perry's Expedition I had called *Chrysosplenium oppositifolium*, is now, by better specimens, shown to be *C. Kamtschaticum*. The seeds are narrowly oblong, smooth and glabrous, and more than twice the size of those of *C. oppositifolium*, which are short-ovoid and minutely roughened under a lens, and the floral leaves are more toothed. The seeds of *C. glechomæfolium*, Nutt. (which is very near *C. Nepalense*), are smooth and globular. Those of *C. Americanum* are oval and hispid. An interesting rediscovery is that of *C. ovalifolium* of M. Bieb. and of Ledebour, 1830, — not before known in fruit, but which I now can identify with Chamisso's *C. macrocarpum*, whose more appropriate name was published in 1831, and also with Trautvetter's *C. Sedakowii*. A new character is appended, drawn from Mr. Wright's specimens, gathered in mountain rivulets near Hakodadi.†

The genus *Hydrangea* is divided between Japan, with the Himalayas and the mountains of Java, on the one hand, and the Alleghany region of the United States on the other. In addition, Japan has the allied genera *Cardiandra*, *Schizophragma*, and *Platy crater*; the Himalayas, &c., *Adamia* (of which *Broussaissia* is the counterpart in the

* RODGERSIA, Nov. Gen.

Calyx tubo brevissimo turbinato basi ovarii adnato, limbo petaloideo 5-partito, lobis æstivatione valvatis ovatis post anthesin patentissimis persistentibus. Corolla nulla. Stamina 10, perigyna, calycis lobis opposita et alterna, iisdem mox longiora: filamenta subulata persistentia: antheræ innatæ, subdidymæ, longitudinaliter dehiscentes. Ovarium 2–3-loculare, 2–3-styla: styli subulati, stigmatibus crassis subcapitatis terminati. Ovula plurima, in placenta axili crassa retrorsum imbricata, pendentia. Semina immatura scobiformia, testa laxa utrinque producta. — Herba insignis, 3–4-pedalis, caule valido e rhizomate percrasso horizontali erecto 3–5-foliato; foliis magnis alternis (radicalibus maximis longe petiolatis, limbo nunc bipedali!) palmatim peltatimve 5-sectis, summis trisectis vel trilobatis, foliolis sessilibus cuneatis apice inciso-lobatis margine undique argute serratis, petiolo basi scarioso-dilatato seu adnatim stipulato; cymis scorpioideis plurimis in paniculam thyrsioideam nudam amplissimam collectis; floribus subsessilibus subsecundis ebracteatis luteo-albis.

RODGERSIA PODOPHYLLA. Hakodadi, etc. — Genus ab *Astilbi* plane diversum; calyce rotato-patente subampliato, æstivatione valvato, seminibus descendentibus, necnon habitu, floribus ut videtur hermaphroditis, inflorescentia cymosa, bracteis bracteolisque nullis, ovariis usque ad apicem coalitis: ab *Oresitrophii*, inflorescentia, ovario e carpellis alte connatis biloculari, ovulis seminibusque pendulis.

† CHRYSOSPLENium OVALIFOLIUM (M. Bieb. ex Ledeb.): fere glabrum; caule basi repente nudo superne foliato (spithamæo et ultra); foliis aut oppositis aut alternis obovato-orbiculatis cuneatisve pl. m. crenatis, superioribus caul. ster. late ovalibus; cyma laxa basi nuda; floribus longiuscule pedicellatis; capsula maxima (4–5 lin. longa), valvis oblongis calycem plus duplo superantibus; seminibus ovoideis nitidis hispidulis (iis *C. oppositifolii* paullo majoribus).

Sandwich Islands) and Hooker's *Piliostegia*; and our Alleghany region, *Decumaria*. *Deutzia* is divided between Japan and the Himalayas (*D. staminea* of the latter differs from *D. crenata* of the former in the calyx-teeth and some subsidiary characters), and has an American analogue, but not a close one, in *Fendlera*. *Philadelphus* has one Himalayo-Japanese species (doubtless not indigenous in Europe); the rest of the genus is North American, partly western and partly eastern.

Itea Chinensis has not yet been found in Japan, but Mr. Wright gathered a form of it in the Loo Choo Islands. Hooker and Thomson found the same species in the eastern Himalayas. The type of the genus, and the only American species, belongs to the Atlantic United States.

Crassulaceæ. *Penthorum Chinense* (not yet detected in Japan) is apparently identical with the original *P. sedoides*, so abundant throughout the eastern part of North America, but unknown in the western. Hooker and Thomson's *Triactina*, of the Sikkim Himalayas, is only in a general way analogous to the American *Diamorpha* of Nuttall.

Hamamelideæ. Mr. Wright met with nothing of this order in Japan, but found a *Distylium* — apparently a variety of the Japanese species — in the Loo Choo Islands. *Hamamelis Japonica*, which I possess from the Leyden herbarium, is very closely related indeed to the only other strict congener, the *H. Virginica* of Eastern America. The species of the eastern borders of India, Dr. Hooker identifies with Brown's *H. Chinensis*. *Corylopsis* of Japan and the eastern Himalayas is analogous to *Fothergilla*, of the eastern borders of the United States. There is also a *Liquidambar* in Japan. The order is absent from the whole region west of the Mississippi, as well as from Europe.

Umbelliferaæ. The additions to the Japan Flora in this order are *Bupleurum multinerve* of Siberia; a new *Angelica*,* of which fruiting specimens were obtained only at Katonasima, one of the islands between Japan and the proper Loo Choo group; and the European *Anthriscus sylvestris*, as it must be called, on account of the oblong and smooth fruit, rather than *A. nemorosa*, which is already recorded from the adjacent continent. There is, indeed, a minute ring of hairs at the base of the fruit; but this likewise is to be found in specimens of *A. sylvestris* of Western Europe. The two species are probably one.

* ANGELICA JAPONICA (sp. nov.): procera; foliis bipinnatisectis glabris, segmentis ovatis acuminatis argute serratis ultimis sæpe trilobis, superioribus sessilibus basique ala integerrima decurrente; umbella cauleque superne tomentulosis; involuclis polyphyllis, foliolis parvis scariosis lanceolatis acuminatis; alis fructus latiusculis jugisque subsuberosis; vittis commissuralibus 4. Cape Soya (in flower).

Mr. Wright did not obtain in Japan (where it was found by Drs. Williams and Morrow) the *Celospermum Gmelini* of Ledebour (*Physolophium saxatile*, Turcz.), but he collected fine fruiting specimens in Behring's Straits. An examination of these, and a comparison with the plant of Northern Oregon, and with that inhabiting the coast of the northern part of New England, shows (what I have long suspected), — 1. that *A. peregrina* of Nuttall, from both shores of North America, is of the same species; and 2. that the characters upon which De Candolle's *Archangelica Gmelini* has been separated from that genus are variable and of no moment. Indeed, it were better to restore *Archangelica* itself to *Angelica*. As to the number of vittæ, they vary in *A. Gmelini*, but are commonly rather few, only one for each interval, and two on the commissure, as stated in the *Florula Ochotensis*.

If the undeveloped specimens which, in Perry's Expedition, I doubtfully referred to *Archangelica officinalis*, DC., are identical with a low, littoral Umbellifer which Mr. Wright collected in the Loo Choo Islands, it may be held to be merely a glabrate variety of a plant discovered by Dr. J. G. Cooper on the sandy beaches of Puget's Sound, which I have characterized in the Botanical Appendix to the Report of Stevens's Pacific Railroad Exploration (still unpublished), under the name of *Cymopterus? littoralis*.

Some other American Umbelliferæ, of more southern range, also inhabit Japan, viz. *Cryptotenia Canadensis* (unknown west of the Mississippi valley), an *Archemora* (fide Zuccarini), *Heracleum lanatum*, and *Osmorrhiza longistylis*.

Most of the *Araliaceæ* of Japan are of Eastern and insular rather than of North American types. But it is quite otherwise in respect to the two plants of the order which were collected in the northern part of Japan. One of them is *Echinopanax horridus* (*Panax*, Smith, Hook.) of Northwestern America; the other, the still more interesting *Aralia* (*Ginseng*) *quinquefolia*, exactly our Northeastern American Ginseng, which is unknown west of the Mississippi and the Great Lakes. The early missionaries were correct in their identification of the Ginseng of America with that of Tartary; and the Himalayan plant may be safely added to the species. And *Aralia edulis* of Japan is analogous to our Eastern American *A. racemosa*. On the other hand, *Hedera Helix* of the Old World (of which *H. rhombea*, Sieb. & Zucc. is merely a form) is apparently indigenous to Japan, as well as to the Himalayas, although it appears not to extend through Northern Asia.

Cornaceæ. Upon the mountains northeast of Hakodadi, Mr. Wright gathered not only *Cornus Suecica*, which extends all round the borders of the frigid zone, but likewise our *C. Canadensis*, which has also been detected in the adjacent Kurile Islands, and

therefore has a continuous range from Newfoundland and Labrador to Japan. As to representatives, *Cornus officinalis* of Japan is very like *C. sessilis*, Torr., of California, on the one hand, and *C. mas*, of the Old World, on the other. *C. sanguinea*, extending from Europe to Japan, is represented by *C. Californica*, &c. in Western America, and by *C. sericea* east of the Rocky Mountains; and *C. alba* of Siberia and Japan may prove hardly distinct from our *C. stolonifera*. Even *Benthamia fragifera* of the Himalayas and *B. Japonica* of Japan cannot be generically different from our *Cornus florida* and its western form, *C. Nuttallii* of Audubon.

The *Caprifoliaceæ* of Japan are interesting under the same point of view. *Abelia* is peculiar to Japan, China, and the Himalayas. *Diervilla* (including *Weigela*) is divided between Japan (and the adjacent mainland) and Eastern North America. I was disposed to regard *Weigela* as a distinct genus, on account of the ampliate corolla, the deciduous limb of the calyx, the coriaceous capsule, and the reticulate-winged seeds. The last three distinctions were probably unknown to Mr. Brown when he united *Weigela* to *Diervilla*, as they certainly were to Alph. De Candolle when he again separated them, and referred Bunge's *Calysphyrum* to *Weigela*. Confidently reducing another genus of the Russian botanists, viz. the *Calyptrostigma Middendorffianum* of Trautvetter and Meyer's *Florula Ochotensis*, I must at the same time admit that Mr. Brown's sagacity was not at fault. I have not seen Bunge's *Calysphyrum*; but fruiting specimens of the Okotsk species, *Diervilla* (*Weigela*) *Middendorffiana*, were brought by Mr. Wright's assistant from Ayan. These, in this state, much resemble *Diervilla sessilifolia* of the Alleghany Mountains, and have an equally thin capsule, upon which the limb of the calyx is about equally persistent; that is, it persists until the fruit matures, and is then apt to fall off. The unequal union of the calyx-lobes in Middendorff's plant is probably accidental, and has been noticed by De Candolle in Bunge's *Calysphyrum*; the stigma is not essentially unlike that of the Japanese species in the bud (cap-shaped, at length becoming broadly peltate); and I have some doubt whether the anthers are really connivent after the flower opens, as represented. Finally, the seeds of the American species, although wingless, are invested with a close cellular pellicle, of a structure similar to that of the wing of the Asiatic species, which, moreover, is occasionally little developed.

To *Diervilla Japonica*, I refer the *D. Coræensis*, DC., also *D. grandiflora* and *D. versicolor*, Sieb. & Zucc., and the *Weigela rosea* of the gardens; and unite the *D. hortensis*, Sieb. & Zucc. to *D. floribunda*.

Additional specimens of the plant named *Lonicera Morrowi* in Perry's Expedition call for some alteration in the character; the species is nearly related to *L. Xylosteum* of Europe, &c. De Candolle's *L. brachypoda* is probably *L. cærulea*.

Viburnum Opulus was detected in the northern island: this species extends all round the world in the cooler latitudes. *V. plicatum*, Thunb., I have elsewhere identified with *V. lantanoides*, Michx., which is peculiar to the cool, moist woods of Canada and of the Northern United States, not extending westward beyond the Great Lakes. This and the last species, as well as others, have good stipules. *V. tomentosum*, Thunb., which, in Perry's Expedition, I referred, without sufficient reason, to the preceding species, I now suspect to be a radiate variety of Thunberg's *V. dilatatum*. This Mr. Wright collected abundantly, but uniformly rayless; the leaves much like those of *V. Lantana* of Europe, only not at all cordate, and more downy beneath. A less downy state of *V. dilatatum* (var. *nudiusculum*) is the *V. erosum* of De Candolle, Zuccarini, and of my enumeration of Drs. Williams and Morrow's collection, clearly passing into the former species on the one hand, and on the other perhaps not distinct enough from the genuine *V. erosum* of Thunberg. The latter, however, which was abundantly gathered near Hakodadi (while the variety of *V. dilatatum* came from Simoda), appears to be distinguished by its general smoothness, its thin leaves more coarsely toothed and conspicuously acuminate, and its smaller and simpler, long-peduncled cymes. I have seen no Japanese *Viburnum* answering to *V. cordifolium*, Wall., said by Dr. Hooker to occur in Japan. Fragments of the Himalayan plant most resemble *V. plicatum*. I cannot identify Thunberg's *V. cuspidatum*.

Japanese specimens are quite intermediate between the *Sambucus racemosa* of the Old World, and the North American *S. pubens*.

Rubiaceæ. The *Asperula odorata* was again collected, apparently indigenous; also *Galium pauciflorum*, Bunge, a mere variety of *G. Aparine*; *G. verum*, var. *lasiocarpum*; and *G. triflorum*, exactly like North American, Russian, and Scandinavian specimens. The species is not recorded from Northern Asia; and Dr. Hooker's Himalayan plant of the name slightly differs. My *G. trachyspermum* was gathered in better specimens (as also from Loo Choo), and with two marked varieties.* The only other addition to the Japanese Flora in this order is a dwarf and fleshy variety of *Oldenlandia paniculata*, from the southern extremity of Kiu-siu, also from Loo Choo.†

* *GALIUM TRACHYSPERMUM*, Gray, in *Perry's Jap. Exped.* 2, p. 313. *G. rotundum* (rotundifolium), Thunb. Var. *GRACILENS*: foliis lanceolatis; pedicellis gracilioribus; floribus parvis. Simoda.

Var. *SETULIFLORUM*: foliis ovalibus oblongis lanceolatisve; corolla extus parce hispida. Simoda, Agenhu.

† The following are new *Rubiaceæ* from the Bonin collection:—

PSYCHOTRIA HOMALOSPERMA (sp. nov.): arborescens, glaberrima; stipulis brevibus latis basi excepta caducis; foliis obovatis seu obovato-oblongis breviter acuminatis basi in petiolum longiusculum angustatis opacis; pedunculo terminali nunc sublaterali ancipiti foliis dimidio breviores; cyma laxiflora; floribus fructi-

To *Valeriana dioica* (apparently wanting in Northern Asia) I now refer better specimens of the plant which I formerly named *V. Tripteris*: it ranges through the northern part of the American continent (but is rare eastward) under the name of *V. sylvatica*.

Compositæ. Specimens gathered at Tanegasima, off the south end of Kiu-siu, manifestly of Thunberg's *Aster hispidus* (excl. syn. Kæmpf.), have led me to the correction of a mistake, which originated in a wrong reference by Thunberg to Kæmpfer's *Amœnitates*, and the consequent application of the name, *Aster hispidus*, to plate 29 of Kæmpfer's *Icones Selectæ*, ed. Banks, representing a plant which by no means accords with Thunberg's description. This, not having been perceived by Zuccarini, has led to further confusion. Suffice it briefly to say, that *Heteropappus hispidus*, Less. & DC., excl. syn. Kæmpf. (*Aster hispidus*, Thunb.), is clearly identical with *Heteropappus rigens*, Sieb. & Zucc., perhaps *H. subserratus* also; and the genus ought to subside into a section of *Calimeris*.* Kæmpfer's plant, on the other hand, is manifestly what I had named *Dœllingeria scabra*? in Perry's Expedition, and is the "*Dœllingeria* n. sp.," Hook. & Arn. Bot. Beech. Voy. p. 195, but is hardly *D. trichocarpa*, DC. It is a genuine *Aster*, and may (for all I see to the contrary) take the name of *Aster Kämpferi*. Zuccarini would appear to have received the Siberian *Calimeris incisa* from Japan:

busque pro genere maximis, alaribus sessilibus; calycis limbo brevi fere integerrimo; corolla hypocraterimorpha, tubo lobis ter longiore intus nudo; pyreniis 2 cartilagineis latissime ovatis valde complanatis dorso ad medium et margines tenuiter cristato-costatis; semine plano lamellæformi. Bonin Islands. — A remarkable species of Bentham's section *Notopleura*.

STYLOCORYNE? SUBSESSILIS (sp. nov.): fruticosa; foliis brevissime petiolatis e basi rotundata ovato-oblongis acuminatis subcoriaceis supra glaberrimis subtus cum ramulis junioribus striguloso-pubescentibus; cyma terminali sessili densa; baccis globosis 1 – 6-spermis. Bonin Islands.

HEDYOTIS LEPTOPETALA (sp. nov.): suffruticosa, glaberrima; caule quadrimarginato; stipulis brevibus nudis; foliis ovato- seu oblongo-lanceolatis subacuminatis mucronato-acutis basi sæpius acutis brevissime petiolatis chartaceis subtus fere aveniis; cyma terminali composita densiflora; calyce cyathiformi truncato brevissime 4-dentato pedicello 2 – 3-plo brevior; corollæ 4-partitæ nudæ tubo globoso, segmentis longe linearibus; filamentis styloque gracillimis glabris; capsula ovoidea apice libera primum loculicida demum septicida dicocca. *H. multiflora*, Hook & Arn. Bot. Beech. p. 264, non Cav. Bonin Islands.

* The following, from one of the islands south of Japan, is very closely related to *Heteropappus hispidus*, but is a true *Calimeris*: —

CALIMERIS CILIATA (sp. nov.): subpedalis; caulibus ramisque adscendentibus foliosis fere glabris mono-oligocephalis; foliis radicalibus oblongo-spathulatis obtusis crenato-serratis, caulinis oblanceolatis linearibusque basi angustata sessilibus integerrimis, omnibus hispido-ciliatis, paginis glabris; involucri squamis biseriatis laxis herbaceis lineari-attenuatis cuspidatis hispido-ciliatis; pappo rufo rigido achenio hirsuto subdimidio brevior, radio conformi sed parciore. Ousima.

to it, under the name of *Heteropappus incisus*, Sieb. & Zucc., he has wrongly referred both Kämpfer's and Thunberg's plants as synonymes.

Lessing's *Aster Japonicus*, with a dubious variety, I must refer to *Erigeron*.* It is the Japanese analogue of the Californian *E. glaucum*.

The form of *Solidago Virgaurea* common at the Loo Choo Islands and Hong Kong (var. *leiocarpa* = *Amphirepis leiocarpa*, Benth.) was likewise found in the southern part of Japan. It quite resembles European forms of the species, except in the glabrous achenia. This character it shares with *S. thyrsoides*, Meyer (*S. leiocarpa*, DC.), a subalpine plant in Eastern North America, and probably another form of *S. Virgaurea*.

None of our collectors met with De Candolle and Zuccarini's *Porophyllum Japonicum*; which is surely not of this genus at all, but a *Gynura*,—most probably (since, according to Siebold, the plant was imported from China) *G. pinnatifida*, DC., the *Cacalia pinnatifida* of Loureiro. I presume there are no Asiatic species of the genus *Porophyllum*.

The collection affords an addition to the genus *Erythrochæte*, Sieb. & Zucc., but only a single specimen of it.† *Cacalia hastata*, Linn., the North Asian and Eastern European analogue of our Eastern American *C. suaveolens*, was found at Cape Soya, along with *Senecio palmatus*, Pall.; also, on the sea-shore, *S. Pseudo-Arnica*, a subarctic species of both shores of America.

Besides *Cirsium Kamtschaticum* at the north, and *C. Japonicum*, DC., farther south, there are in the collection specimens of a Thistle related to *C. eriophorum*, and which, indeed, I should take for Thunberg's *Carduus eriophorus*, if De Candolle had not referred that to his *C. Japonicum*, upon the authority of a Thunbergian specimen. It cannot well be *C. lappaceum*; so I am obliged to consider it new.‡

* ERIGERON (STENACTIS) THUNBERGII. Inula dubia, Thunb. Aster Japonicus, Less., etc. Erigeron pulchellum? Gray in Perry's *Exped.* (Ligulæ purpurascens).

Var.? GLABRATUM: caule validiore brevior apice nudo glanduloso; foliis glabris raro villosociliatis; involucri multo minus hirsuto; ligulis purpureis. Cape Siriki-saki.

† ERYTHROCHÆTE DENTATA (sp. nov.): foliis caulinis late cordatis crenato-dentatis, petiolo alato basi dilatata amplexicauli; involucri breviter campanulato. Nippon. "Flores purpurei."

‡ CIRSIUM (ERIOLEPIS) PECTINELLUM (sp. nov.): caule stricto hirtello apice arachnoideo; foliis supra scabridis viridibus subtus albo-lanatis profunde pinnatifidis, supremis basi angusta spinulifera sessilibus, cæteris in alas angustissimas lineasve pectinatim setosas longe decurrentibus, lobis lanceolatis sensim acuminatis mucrone vix pungente apiculatis; capitulis 2–3 breve pedunculatis subglobosis; involucri arachnoidei squamis e basi lanceolato subulato-acuminatissimis inermibus recurvato-patentibus. Nippon, Jesso.—Capitula iis *C. eriophori* dimidio minora, squamis involucri debilioribus magis caudatis, nec spiniferis.

Thunberg's *Carduus acaulis* was not met with in Japan, but a species probably the same was collected in various islands of the Loo Choo group.*

Among the *Cichoraceæ* is a new, small-flowered *Lampsana*, with the involucre only about two lines long in anthesis, and little longer in fruit.†

Youngia Japonica, DC. (*Prenanthes Japonica*, Linn., Thunb.) doubtless includes *Y. Thunbergiana*, *multiflora*, *runcinata*, and probably all of the eight species known to De Candolle except *Y. Mauritiana* (which I have not seen) and the ambiguous *Y. napifolia*. The pubescent tube of the corolla, the uniserial pappus, and the habit, may keep the genus distinct from *Crepis*. Under the name of *Youngia integra*, I refer to the genus — notwithstanding a somewhat different aspect — a plant gathered at Tanegasima, off the south end of Kiu-siu, and abundantly in Ousima and the Loo Choo Islands, which is doubtless Thunberg's *Prenanthes integra*, therefore De Candolle's *Y. lanceolata*, but whether Houttuyn's *Prenanthes lanceolata* is doubtful. That specific name, certainly, is not a good one for our plant. The rest of the Japanese species appended by De Candolle to *Youngia*, with a mark of doubt, I can now confidently refer, along with some new ones, to Cassini's genus *Ixeris*. I would add Don's *Chorisma* (*Chorisis*, DC.) to the number; remarking that Don had no good reason for describing the blossoms of *Chorisis repens* as "pale blue," and De Candolle still less for dropping the qualifying adjective. Linnæus in the original account called them yellow, and so they are. It is singular that a plant which inhabits these shores, from Loo Choo and Hong Kong to Kamtschatka, should have so long escaped rediscovery. I append the characters of the Japanese species before me, and of a doubtful one from the Bonin Islands.‡

* *CIRSIIUM BREVICAULE* (sp. nov.): foliis profunde pinnatifidis dentatis spinosis et spinuloso-ciliatis utrinque glabris (costa subtus primum arachnoidea), radicalibus caule arachnoideo plerumque longioribus, caulinis semi-amplexicaulibus haud decurrentibus oblongis; capitulis 2–5 subcorymbosis breve pedunculatis; involucri pl. m. folioso bracteato hemisphærico glabro, squamis lanceolatis acuminatis erectis, exterioribus ovato-lanceolatis spinula terminatis. *Carduus acaulis*, Thunb.? *Cirsium Japonicum*, Hook & Arn.? Loo Choo Islands, etc.

† *LAMPSANA PARVIFLORA* (sp. nov.): glabra vel glabriuscula; caulibus e radice annua debilibus diffusis; foliis fere omnibus lyrato-pinnatifidis; capitulis laxè paniculatis parvis 14–20-floris; involucri squamis fructiferis planis ecarinatis acuminatis; acheniis breviter oblongis subcompressis, marginibus acutis hispidulo-scabris. Simoda, Hakodadi.

‡ *IXERIS STOLONIFERA* (sp. nov.): pumila, subglauca; stolonibus filiformibus prorepentibus foliatis; foliis orbiculatis late ovalibusve basi obtusis vel subcordatis plerumque integerrimis petioli filiformi brevioribus; pedunculis elongatis scapisve monocephalis nudis; involucri 15–20-floro; acheniis ovali-oblongis rostro suo brevioribus, costis crassis lævibus. — Variat, foliis 2–12 lin. longis nunc parce denticulatis, nunc basi sub-

There are no *Lobeliaceæ* in the collection, and no *Campanulaceæ* new to Japan.

Ericaceæ. An interesting discovery is that of the American Cranberry (*Vaccinium macrocarpon*) in the northern part of Japan. I have never received this species from the western side of our continent, nor is it recorded from Russian America. Douglas, however, found it at the mouth of the Oregon, and states it to be common there. *Vaccinium Vitis-Idæa*, although equally new to the flora of Japan, is there within its

hastato-bidentatis; scapo digitali ad spithamæam; floribus flavis. Hakodadi; Simoda; Kagosima Bay, Kiu-siu. — Doubtless the *Youngia pygmæa* of Ledebour and Zuccarini, as to their Japan plant, but not *Prenanthes debilis*, Thunb., and not even a congener of *Prenanthes pygmæa*, Ledeb. (*Crepis nana* of Richardson), which is apparently a *Crepis*.

IXERIS DEBILIS: caulibus gracilibus laxis basi stoloniferis superne longe nudis 1–5-cephalis; foliis radicalibus et stolonum obovato-spathulatis oblongis sublanceolatisve in petiolum longum attenuatis integerrimis vel denticulatis nunc pinnatifido-dentatis, caulinis subnullis paucisve; involucri 20–25-floro; acheniis breviter oblongis alato-costatis rostro suo æquilongis, costis lævibus. *Prenanthes debilis*, Thunb. *Fl. Jap. & Ic. Pl. Jap. t.* 39. *P. humilis*, Thunb.? *Youngia*? *debilis*, DC. Hakodadi, Simoda, etc. — Spithamæa ad pedalem: folia 3–5-pollicaria.

IXERIS (CHORISIS) REPENS: caulibus humifusis longe repentibus; foliis petiolo brevioribus trilobis tripartitis trisectisve, nunc pedato-5-sectis raro integris, segmentis obovatis vel rotundatis obsolete denticulatis vel subsinuatis; pedunculis oppositifoliis petiolum superantibus 1–3-cephalis parce bracteatis aut unifoliatis; involucri 20–30-floro; floribus flavis; acheniis oblongis crasse 10-costatis (haud compressis) rostro quadruplo longioribus, costis acutiusculis acie minutissime scabriusculis; pappo pluriseriali. *Prenanthes repens*, Linn. *Chorisma repens*, Don. *Chorisis repens*, DC. *Nabalus repens*, Ledeb. Hakodadi, Japan; Loo Choo Islands; Hong Kong; on the sands of the sea-shore.

IXERIS RAMOSISSIMA: glaucescens; caule paniculato ramoso folioso; foliis oblongis argute dentatis nunc runcinatis, infimis in petiolum marginatum longe attenuatis, superioribus basi auriculata vel hastata amplexicaulibus; capitulis numerosis corymbosis breviter pedicellatis 10–12-floris; corollis flavis; acheniis fusiformibus in rostrum breve vel longiusculum attenuatis, costis prominulis obtusis scabriusculis; pappo uniseriali. *Prenanthes hastata*, Thunb. *ex char.* Forma runcinata est *Brachyramphus*? *ramosissimus*, Benth. in *Lond. Jour. Bot.* 1. p. 489. Kagosima Bay, Kiu-siu. — The achenia are similar to those of *Ixeris versicolor*, DC., but not of genuine *Ixeris*; yet the plant is best referred to this genus.

IXERIS (IXERIDIUM) CAPITULUM 5–10-florum; pappus sordescens) *THUNBERGHII*: caulibus basi vix stoloniferis foliosis superne parce ramosis; foliis oblongis membranaceis apice cuspidatis, radicalibus longe petiolatis plerisque laciniato-dentatis sublobatisve, caulinis basi lata vel cordata semi-amplexicaulibus infra medium pectinatim spinuloso-dentatis; panicula corymbosa vel fastigiata polycephala; involucri 6–8-phyllo 5–10-floro; floribus flavis; acheniis fusiformibus sensim longiuscule rostratis leviter 10-costatis glaberrimis; pappo uniseriali. *Prenanthes dentata*, Thunb. *Youngia dentata*, DC. — Var. *gracilior*; foliis angustioribus subintegerrimis basi nunc ciliato-dentatis. Simoda, Hakodadi. — This and the next must be congeners of *Ixeris versicolor*, DC., and probably of Miquel's *Aracium*.

IXERIS (IXERIDIUM) ALBIFLORA (sp. nov.): caulibus gracilibus basi stoloniferis gracilibus unifoliatis laxè 3–6-cephalis; foliis oblongo-lanceolatis integerrimis acuminato-cuspidatis, radicalibus in petiolum gracilem

known range. The same district (viz. the mountains northeast of Hakodadi) furnished a new *Vaccinium*, which in aspect, and in all its characters except the fruit, accords with the Blueberries of Eastern North America; but the fruit is that of *Euvaccinium*. As Mr. Small detected it again on Cape Romanzoff, it is only just that the species should bear the name of Mr. Wright's humble, but invaluable assistant.* *V. bracteatum* was not met with; but in one of the islands south of Japan an allied new species was discovered.†

Empetrum nigrum, Linn., was gathered on Cape Siriki-Saki, Nippon, apparently near the sea-level, in lat. $41\frac{1}{2}^{\circ}$.

The vicinity of Hakodadi furnished a new *Leucothoë*, said to have light-green blos-

attenuatis, caulino subsessili basi utrinque sæpius 1–2-setigero; pedicellis gracilibus; involucri 5–6-floro; floribus albis; acheniis fusiformibus sensim longiuscule rostratis, costis scabriusculis. Cape Siriki-Saki, Nippon.

IXERIS? (*IXERIDIUM?*) *LINGUÆFOLIA* (sp. nov.): caule folioso suffruticoso superne paniculato; foliis subglaucis crassiusculis integerrimis sessilibus obtusissimis, in caudice crasso lingulatis basi angustatis, in caulibus ramisque herbaceis floridis oblongis mucronatis basi cordata amplexicaulibus; capitulis numerosissimis parvis confertissime corymbosis; involucri cylindrico 4–5-phyllo vix calyculato 5-floro; “floribus albidis vel flavidis”; acheniis valde immaturis oblongis 10-striatis apice infra discum planum in collum constrictis; pappo sordescente uniseriali. Bonin Islands.

* *VACCINIUM SMALLII* (sp. nov.): caule 3–5-pedali ramulisque teretibus glabris; foliis deciduis ovalibus oblongisve breve acuminatis subsessilibus penniveniis creberrime ciliato-serrulatis ad costam venisque præsertim subtus pubescentibus; fasciculis corymbisve paucifloris sessilibus e gemma terminali; bracteis caducis; calycis limbo 5-fido, lobis semi-orbiculatis glanduloso-ciliolatis; corolla incarnata vel rubra breviter campanulata; filamentis villosis; antheris exaristatis, tubulis longis subexsertis; ovario 5-loculari.

On the western coast of Kamtschatka, Mr. Small also rediscovered the very rare *V. præstans*, mostly in fruit, but with a flower or two, which enables me to complete its characters.

VACCINIUM PRÆSTANS (Lamb.): pygmæum; caule 2–3-pollicari e basi gracili repente adsurgente inferne bracteato superne 3–5-foliato; foliis late obovatis ovatisve in petiolum subito contractis reticulato-venosis argute mucronato-serrulatis ciliatis subtus ad venas pubescentibus pro planta magnis ($1\frac{1}{2}$ –2-pollic.) deciduis; racemo brevi 3–5-floro; bracteis lanceolatis scariosis deciduis; calycis limbo 5-lobato, lobis ovatis ciliatis; corolla cylindræo-campanulata; filamentis pilosis; antheris inclusis, loculis breviter tubulosis, arista dorsali obsoleta; bacca ampla 5-loculari.

† *VACCINIUM* (*BATODENDRON*) *WRIGHTII* (sp. nov.): glaberrimum, 2–5-pedale; foliis coriaceis perennantibus opacis ovatis oblongisve utrinque acutis vel subacuminatis subserratis; racemis brevibus laxifloris; pedicellis secundis nutantibus bracteam scariosam deciduam ter superantibus; calycis lobis acutissimis; corolla rubella glabra obovato-urceolata 5-carinulata, ore 5-dentato; filamentis villosis; aristis antherarum arrectis tubulis gracilibus brevioribus; ovario sub-10-loculari. Ousima. — Pedicels articulated with the flower, as in *V. bracteatum*, &c., and in our American *V. arboreum*. Not so in *V. stamineum*, which is the type of a peculiar section (*Picrococcus*, Nutt.), quite distinct from *Batodendron*.

soms.* I refer the plant to this genus rather than to *Gaultheria*,† on account of the calyx being wholly unchanged in fruit, beneath the naked capsule, and the placentæ pendulous from the summit of the cells. On the mountains in the vicinity were gathered *Ledum palustre*, both the ordinary form, so common in Europe, but only high northern in America, and the variety *dilatatum* of Wahlenberg, which very closely approaches our *L. latifolium*, but has oval capsules and less blunt leaves. Also, — and a more interesting discovery in Japan, — *Menziesia ferruginea*, and this, too, in the form essentially identical with that of our higher Alleghanies (*M. globularis*, Salisb.) rather than that of the northwest coast and islands. The differences are so unimportant, however, and the two supposed species so connected by means of an intermediate form, discovered by Drummond at an intermediate station (viz. in the northern Rocky Mountains), that I had long ago confidently regarded them as one.

The geographical range of this species, as now extended, is instructive. This, and the numerous similar instances already mentioned, or to be mentioned, are particularly recommended to the consideration of those (such as De Candolle the younger) who, although convinced that species in general have had a single, local origin, are yet constrained to adopt the hypothesis of a double origin in the special case of certain species known to occur only in two widely dis severed regions ; — e. g. *Phryma leptostachia* in Nepaul, as well as in North America east of the Mississippi ; or our own *Diphylleia* and *Caulophyllum*, occurring only here and in Japan. The number of instances, 1. of species strictly divided between Eastern North America and some part of Northern Asia ; and 2. of those which are known to occur at one, two, or several intermediate stations, — is already so increased, that they can no longer be regarded as exceptional or casual, but must evidently receive a common explanation. And what that explanation is begins to be clear.

It was with pleasure that I observed in the present collection undoubtedly wild specimens of the miniature *Azalea* which I published under the name of *A. serpyllifolia*, with leaves, &c. no larger than those of Williams and Morrow's specimens. The Japanese have such fondness for, and such skill in producing, wonderfully depauperate

* *LEUCOTHOE CHLORANTHA* (sp. nov.) : humilis, 1 – 2-pedalis ; ramis glabris ; foliis chartaceis subsessilibus ovalibus hirtello-ciliatis subtus reticulato-venosis, junioribus pl. m. hirtellis ; racemis terminalibus erectis patentibusque fere glabris basi foliatis ; bracteis plerisque lineari-lanceolatis flores subsecundos haud superantibus ; pedicellis calyce æquilongis vel paullo longioribus ; corolla globosa deinde breviter campanulata viridula ; filamentis scabris ; antheris muticis. Hakodadi.

† Siebold and Zuccarini have a *Gaultheria* from Japan ; I know not whether allied to *G. Shallon* of Western, or *G. procumbens* of Eastern, North America.

varieties of plants, that the former cultivated specimens might be supposed to have been the subjects of this singular art.

Besides *Azalea Indica* and *ledifolia* (both wild and cultivated), of the typical form of that region, there were also scanty specimens of an *Azalea* of the American type, which appears to be new.* And *Rhododendron brachycarpum*, Don, rediscovered on the mountains northeast of Hakodadi, singularly resembles the *R. Catawbiense* of our Southern Alleghanies, from which it is distinguished by rather slight characters. So *Clethra barbinervis*, Sieb. & Zucc., appears not much unlike the Alleghanian *C. acuminata*, Michx.

Besides *Pyrola rotundifolia*, *P. minor*, and *Moneses uniflora*, which are dispersed around the world, there is also a specimen of *P. media*, which has not been observed in Asia east of the Caucasus, nor in America.

Diapensia Lapponica, the only strictly alpine plant of the collection, indicates a true alpine region upon the summit of the mountains northeast of Hakodadi, which, however, are said not to attain a great height.

The *Styracaceæ* and *Ebenaceæ*, the *Symplocos* (of Eastern American type), and the *Myrsinaceæ* of Japan, do not call for any particular remark.

Primulaceæ. There is a new Primrose in the collection, of which I possessed a fragment before, — a showy species, which manifestly belongs to Duby's section *Spondyphylla*, although the involucre is not foliaceous, and is a congener of De Vriese's *Cancreinia chrysantha*, although destitute of an epigynous radiate crown.† The three or four species of *Lysimachia* are not American in type (although one is represented in the Sandwich Islands); but the common *Naumburgia* was met with near Hakodadi.‡

* *AZALEA JAPONICA* (sp. nov.): foliis cum floribus coëtaneis spathulato-oblongis obtusis ciliatis concoloribus supra strigoso-hispidulis subtus ad costam parce strigosis; umbella sessili pluriflora; pedicellis tubo corollæ longioribus cum calyce brevissimo pilis longissimis fulvis patentibus hispidis; corolla flava extus tomentello-pubescente; staminibus 5 subinclusis; ovario villosulo-hispidissimo. Hakodadi; in gardens. — *A. Pontica*, *occidentali*, et *calendulaceæ* aff.

† *PRIMULA JAPONICA* (sp. nov.): undique glabra; foliis oblongis spathulatisve obtusis argute sæpius duplicato-denticulatis in petiolum alatum brevem attenuatis membranaceis venosis efarinosis (sed junioribus subtus atomiferis); scapo angulato (1–1½-pedali) multifloro; floribus verticillatis; involucri phyllis lineari-subulatis inappendiculatis integerrimis pedicellis multo brevioribus; calyce ovato-campanulato, lobis triangulari-subulatis tubo intus farinifero æquilongis corollæ purpureæ tubo pluries brevioribus; lobis corollæ obcordatis; capsula globosa vertice nuda demum irregulariter rupta. Hakodadi.

‡ Subjoined are the characters of two new *Primulaceæ* from the islands south of Japan. The first is evidently a close congener of *Androsace saxifragæfolia*, Bunge, of Northern China, and of *A. rotundifolia* and *A. carnosula* of the Himalayas; and with them would probably be separated from that genus, on account of the

Utricularia intermedia is now for the first time met with in Japan. It had been found already upon the Okotsk coast, and in Altai, as well as in Europe and the Northern United States, but not west of the Rocky Mountains.

Zuccarini indicates a *Boschniaka*, probably the *B. glabra* of Siberia and North-western America.

Catalpa Kämpferi is the Japanese analogue of our Southern Alleghanian *Catalpa*; as is *Tecoma grandiflora* of our common Trumpet-Creeper.

The new *Scrophulariaceæ* are a *Scrophularia* resembling *S. aquatica*, but with flowers of twice the size; * a *Veronica* near *V. Chamædrys*, evidently Thunberg's plant of that

five-parted calyx rotately spreading in fruit, were they not connected with it through *A. Gmelini*, *incisa*, &c. The second, much as it resembles the first in floral structure, differs too widely from *Androsace* in inflorescence and habit to be referred to that genus, and its corolla is not at all constricted or fornicate at the throat. The discoverer dedicates the plant to his companion, Mr. W. Stimpson, the acute and assiduous zoölogist of the Expedition.

ANDROSACE PATENS (*C. Wright, ined.*): villosopubescent; foliis omnibus e radice exili rosulatis rotundatis raro subcordatis grosse crenato-dentatis petiolo subæquilongis scapis diffusis multoties brevioribus; umbellæ pauci-plurifloræ pedicellis elongatis divergentibus; involucri parvi phyllis oblongis linearibusque obtusis; calyce alte 5-partito patente corollam adæquante, laciniis oblongo-ovatis hispidulis, post anthesin accrescentibus et subchartaceis nervosis, stellato-patentissimis capsula 5-valvi polysperma paullo longioribus; corolla alba fauce æqualiter leviter constricta, lobis oblongis vix retusis. Ousima; on the grassy summits of mountains. — The specimens are mostly in fruit; a few of the latest flowers show the corolla. Scapes one or two inches long; pedicels in fruit from half an inch to an inch and a half in length. Fructiferous calyx 3 or 4 lines in diameter.

STIMPSONIA, Nov. Gen. C. Wright, ined.

Calyx pentaphyllus, persistens; phyllis linearibus foliaceis, fructiferis leviter accrescentibus patentibus. Corolla hypocraterimorpha, tubo brevi calyce paullo longiore, fauce nuda (pilosula) haud constricta, lobis cuneatis retusis. Antheræ, pistillum, etc. *Androsacis*. Filamenta antheris æquilonga. Capsula globosa, polysperma, 5-valvis (valvis ut in *Androsaci* sepalis oppositis). — Herba annua, exilis, villosopubescent, subviscosa; caule bi-tripollicari erecto simplici vel simpliciter ramoso; foliis alternis teneribus rotundatis argute sæpius duplicato-dentatis, infimis breviter petiolatis, superioribus ad bractæas diminutis pedicellos racemi simplicis erectos breves fulcrantibus; corolla alba.

STIMPSONIA CHAMÆDRIOIDES, C. Wright. — On the sides of mountains, Katonasima. — Habit of *Veronica Chamædrys*, but diminutive, and with alternate leaves.

* SCROPHULARIA ALATA (sp. nov.): glabra; caule valido pl. m. tetraptero; foliis ovatis acuminatis crenatis basi plerumque subcordatis; petiolis alatis inappendiculatis; thyrsos elongatos basi foliatis; cymis pedunculatis laxè multifloris tenuiter glanduloso-pubescentibus; calycis laciniis orbiculatis margine subscariosis; anthera sterili obovato-rotunda petaloidea flabellato-venosa magna (labio postico corollæ vix brevior); capsula ovato-globosa. Hakodadi; Straits of Sangar.

name,* and a marked variety of *V. longifolia*, near *V. luxurians*, Ledeb., but with the leaves whitish-downy beneath and the racemes paniced. I have not seen Thunberg's *Veronica Virginica* (*V. Leptandra, Japonica*, Steud.); but it would seem scarcely different from the Linnæan, Eastern American species. *Pedicularis resupinata*, which extends westward to the eastern borders of Europe, but is not found in Western America, greatly resembles the Eastern American *P. lanceolata*.

Verbenaceæ. Some of the Japanese species of *Callicarpa* are related to *C. Americana* of the Southern Atlantic States; the others are mostly of the Indian type. I suspect that Thunberg's *C. Japonica* is Siebold and Zuccarini's *C. gracilis*, rather than what they take for it.

One plant only of the small Eastern Australian and Polynesian family *Myoporaceæ* occurs in Japan, viz. *Polycœlium bontiodides*, and this is a close representative of a Sandwich Island species.

Labiataë. I have not seen Thunberg's *Teucrium Japonicum*; but the name which he at first applied to it suggests a resemblance to the common Eastern American species. Of the Old-World genus *Ajuga*, there are three species in the collection; one appears to be a more villous variety of Bunge's *A. ciliata* of Northern China, and is probably *A. orientalis*, Thunb.; a second is clearly Thunberg's *A. decumbens*, and perhaps Bentham's *A. remota*; the third is a very small species, apparently new to botanists, which as to floral characters might equally well be referred to *Teucrium*.† At the northern end of Jesso, *Thymus Serpyllum* was met with. It is interesting to see how closely this plant approaches the American continent on both sides (being in Greenland also) without coming into it. At Simoda, and also at the Loo Choo Islands, Bentham's *Calamintha?* *gracilis*, of Java, is abundant. Technically this would be a *Hedeoma*, as the posterior pair of stamens is abortive in all the flowers examined. *Nepeta Glechoma* has developed into a very large form,‡ of which single specimens would naturally be taken for a distinct species. There is an equally marked variety of *Dracocephalum*

* VERONICA THUNBERGII (sp. nov.): caulibus e basi prostrato adscendentibus validis bipedalibus crebre æqualiter velutino-tomentosis; foliis sessilibus ovatis subcordatis obtuse serratis subincisis molliter pubescentibus; racemis laxis plerumque oppositis; pedicellis calyce subæquilongis bractea subdimidio brevioribus; capsula plano-compressa orbiculato-obcordata transverse satis latiori glabra margine ciliata. Hakodadi.

† AJUGA PYGMEA (sp. nov.): glabella, effuse stolonifera, subacaulis; foliis rosulato-confertis spathulatis sinuatis repandisve basi in petiolum attenuatis flores axillares plerumque superantibus; calycis lobis oblongis obtusis; corollæ cœruleæ tubo longe exserto, labio postico bipartito lobis lateralibus paullo brevioribus, antico lobo intermedio emarginato-bifido. Simoda?

‡ NEPOTA GLECHOMA, var. GRANDIS: foliis sesqui-bipollicaribus sinu sæpius levi; calyce magis campanulato, dentibus tubo dimidio brevioribus; corolla in maximis pollicari, tubo exserto. Hakodadi.

Ruyschiana (including *D. Argunense*).* *Scutellaria Indica* in Japan passes by gradations almost into *S. Japonica*, Morr. & Decaisne (growing in shady places, the anthers also minutely and densely ciliate in both), which very closely resembles the scarce Alleghanian *S. saxatilis*; and a *Stachys* from Hakodadi seems to be only a narrow-leaved form of *S. aspera*, Michx., one of the varieties of *S. palustris*.

Several of Thunberg's species of *Ocymum* still remain to be identified.

Borraginaceæ. In the northern part of Japan, the Expedition found *Lithospermum officinale*, *Mertensia maritima*, and good specimens of the plant which, in the Botany of Perry's Expedition, I mentioned as a doubtful *Omphalodes*. But, much as it resembles *O. verna*, the fruit refers it to *Eritrichium* § *Oreocharis*, DC. The species is dedicated to the excellent discoverer, Dr. Williams.† Also a remarkable *Heliotropium*, the flowers of which are surpassed in size only by *H. convolvulaceum* (*Euploca*, Nutt.) of the United States west of the Mississippi.‡ The plant which I had named *Lithospermum? Japonicum* has not been rediscovered.

The single *Apocynea* is the *Nerium divaricatum* of Thunberg, referred by Zuccarini to the South American genus *Malouetia* (*M. Asiatica*, Sieb. & Zucc.), which he could not have done had he possessed the fruit. The plant is evidently a congener of Miquel's *Parechites Borneana*; but it scarcely differs from the genus *Echites* itself, except in wanting the umbraculiform reflexed membrane below the stigma. This is represented in the present plant by a narrow annular indusium, which closely girds the base of the stigma, and to which the anthers adhere.|| I have not seen *Amsonia elliptica*, Sieb. & Zucc., — a representative of a peculiarly Eastern North American genus.

* DRACOCEPHALUM RUYSCHIANA, var. JAPONICUM: caule cum foliorum costa marginibusque revolutis puberulis; bracteis ovatis aristatis villosa-ciliatis calyces hirto-pubescentes æquantibus. Calycis dentes angustiores: corolla ampliata sesquipollicaris, pallide cærulea. Cape Siriki-Saki.

† ERITRICHIMUM GUILIELMI (sp. nov.): *Omphalodi vernæ* simillimum; racemis elongatis nudis; corolla alba fauce lutea; nucibus arrectis a stylo brevi liberis triquetris puberulis facie exteriori planis late deltoidei-ovatis acuminatis, margine acuto integerrimo, stipite crasso. Hakodadi.

‡ HELIOTROPIMUM JAPONICUM (sp. nov.): nanum, e radice perenni multicaule, sericeo-villosum; foliis ellipticis seu obovato-oblongis sessilibus; cymis brevibus confertifloris, calycis hirsutissimi laciniis erectis lineari-lanceolatis obtusis tubo corollæ hirsuto dimidio brevioribus; limbo corollæ amplo (semipollicari) albo valde plicato, lobis subrotundis; antheris mucronulatis; stigmatе conico-agariciformi obtusissimo medio leviter constricto stylo breviorе. Hakodadi, on the sandy shore.

|| PARECHITES THUNBERGII: scandens; foliis lanceolato-oblongis ellipticisve sæpius cum acumine obtuso; laciniis calycis nec carinatis nec ciliatis, singulis glandulis 2 squamæformibus truncatis pectinato-3-6-fidis auctis; corolla alba suaveolente, limbo tubo paullo longiore; antheris basi biaristulatis. Simoda, &c.

Of the other Monopetalous orders, the collection affords nothing new, or worthy of special remark.

Phytolaccaceæ. Linnæus, Thunberg, and all subsequent authors, have referred Kæmpfer's *Jamma Gobo* to *Phytolacca octandra*, — misled in this by the figure, in which the inflorescence appears to be spicate. But Kæmpfer states that the flowers are borne upon pedicels of half an inch in length: they are from 3 to 5 lines long in our specimens. And the plant is an undescribed species (unless it prove to be *P. acinosa*, Roxb. of Nepaul), of well-marked characters, intermediate between our own *P. decandra* and *P. dodecandra*, and destructive of Moquin-Tandon's genus *Pircunia*.* J. Small collected specimens on the west coast of Jesso.

No *Aristolochiaceæ* were collected in this expedition. I have never seen the plant which Thunberg took for *Asarum Virginicum* (*Heterotropa asaroides*, Morr. & Decaisne); but I have long ago indicated its close relationship to the Alleghanian *A. Virginicum*, Linn., and *A. arifolium*. No similar species are found in any other parts of the world. Thunberg has also an *A. Canadense*, — whether really the Eastern American species, or the Western *A. Hookeri*, or an allied species, remains to be determined.

Of *Polygonaceæ*, I need here only mention *P. Sieboldii*, very near our *P. sagittatum*; *P. perfoliatum* and *P. Thunbergii*, representing our *P. arifolium*; *P. multiflorum*, Sieb. & Zucc., which may be our *P. scandens*, or *P. pterocarpum* or *P. dumetorum* of Asia and Europe, &c. All the American analogues here mentioned are wanting on the western side of our continent. The opposite is the case with the subalpine *P. Bistorta*, which occurs in Oregon and the Rocky Mountains, but is wanting farther east.

Thymelæaceæ. The two species of *Stellera* or *Wikstromia*, and the two known species of *Daphne*, were not collected. But there are fruiting specimens of a new *Daphne*, at present clearly distinguishable from the European and Siberian *D. Mezereum* only by the inflorescence; thus suggesting the name which I have applied to it.†

Of *Elæagnaceæ* we have Thunberg's *Elæagnus umbellata*, with indications that it may comprise his *E. multiflora* and *E. pungens*, and certainly Royle's *E. parvifolia*; his *E. macrophylla* (perhaps his *E. glabra* likewise), which, with a new character, will be well

* PHYTOLACCA KÆMPFERI (sp. nov.): caule sulcato; foliis ovalibus ovatisve undulatis; racemis erectis breviter pedunculatis confertifloris folio brevioribus; pedicellis floribus albis subduplo longioribus; staminibus stylisque 8; carpellis axi leviter coadunatis toro brevi cylindræo impositis, maturis tenuiter baccatis.

† DAPHNE PSEUDO-MEZEREUM (sp. nov.): foliis sparsis lanceolato-oblongis seu lato-lanceolatis plerumque obtusis basi in petiolum attenuatis subtus pallidis tenuiter venosis deciduis; floribus plerumque ramulos laterales brevissimos terminantibus vel e basi ramorum hornotinorum ortis brevissime pedicellatis; seminibus exalbuminosis. Simoda.

distinguished from *E. latifolia*; and incomplete specimens of a new species, distinguished by its elongated and upwardly thickened peduncles.*

In *Laurineæ* several Japanese species of *Benzoin* are analogous to ours and to the *Sassafras* of Eastern America, as is *Machilus* to our *Persea*; while *Tetranthera Japonica* has a general analogue on each side of the American continent.

Houttuynia cordata, Thunb., is represented in the southwestern part of North America by Nuttall's *Anemiopsis*; as is *Saururus Loureiri* by our eastern *S. cernuus*, from which it differs only by its short filaments and distinctly pedicelled flowers.

The *Chloranthaceæ* of Japan, &c. have no North American representatives. *Chloranthus serratus* was collected in this expedition. *Sarcandra* of Gardner and Wight rests on a character (the total suppression of the lateral anthers) which Brown had long ago indicated as inconstant. *S. chloranthoides* of Gardner is probably *Chloranthus brachystachys* of Blume, and perhaps Brown's *C. monander*. My *Tricercandra* (which may be Thunberg's *Bladhia glabra*, known only in fruit) was rediscovered in abundant and more fully developed specimens. In a single instance, the vestige of an anther was detected upon the middle filament. A second species, from the north of China (communicated by Dr. Hooker), confirms the genus, while showing that it rests, not upon the order of the suppression of the anthers, but upon the remarkable form of the stamens. These are deciduous, as in *Chloranthus*. The style affords a subsidiary character. I append the diagnoses of the two species.†

Euphorbiaceæ. Siebold and Zuccarini's *Pachysandra terminalis* (sparingly gathered on the mountains northeast of Hakodadi) is a very close (and the only) congener of our *P. procumbens*, which is restricted to a narrow district between the Alleghanies and the Mississippi. *Goughia Nilgherriensis*, Wight, is new to the Japan Flora, &c., but was already known at Hong Kong. The rest of the *Euphorbiaceæ* are also mostly of Indian or Oceanic types, except two *Euphorbiæ*, viz. the *E. palustris* of Europe,

* *ELÆAGNUS LONGIPES* (sp. nov.): arborescens, inermis; ramulis angulatis ferrugineo-lepidotis; foliis membranaceis ovali-oblongis cum acumine obtuso basi acutis supra glabris (junioribus lepidibus parvis parcis caducis conspersis) subtus cinereo-argenteis; pedunculis solitariis clavato-filiformibus ($1\frac{1}{2}$ -pollicaribus) flore multoties longioribus; perigonio cum pedunculo nunc articulado, tubo fusiformi sub limbo cylindræo lobis ovatis dimidio longiori attenuato-constricto. Simoda.

† *TRICERCANDRA QUADRIFOLIA* (Gray in Perry, Jap. Exped. 2. p. 318): foliis ovalibus semper 4 ad apicem caulis nudi quasi verticillatis; stamine intermedio ananthero. Hakodadi.

TRICERCANDRA FORTUNI (sp. nov.): foliis oblongis 6 subdistantibus (i. e. internodiis duplo longioribus); stamine intermedio anthera biloculari, lateralibus antheris unilocularibus instructis; stylo magis producto. N. China, *Fortune*.

and a new species, related to *E. Esula* of the Old World, and to the unpublished *E. leptocera*, Engelm., of California.*

There are no novelties among the *Urticaceæ*. *Laportea bulbifera*, Sieb. & Zucc., I may remark, has the pedicels of the *female* flowers articulated as distinctly as those of the other sex. This and *L. terminalis* (also Himalayan) closely represent our *L. Canadensis*, while the genus is absent from Western America; as also is *Pilea*, though represented by related species in Eastern America and Japan.

The common Hop is indigenous all round the northern temperate zone, and there is a second species in Japan and the vicinity.

Celtis, Elms, *Maclura*, and Mulberry-trees are all absent from Western North America, but all represented in Japan and in Eastern North America, and by nearly related species. *Ulmus parvifolia* much resembles *U. crassifolia*, Nutt., of Louisiana and Texas.

Juglandææ are not indigenous either to Europe or to Western America. But Siebold and Zuccarini mention a Japanese *Juglans*, — probably the one which Thunberg referred to the American Black Walnut; likewise a *Platycarya*, and two species of the Caucasian genus *Pterocarya*. The latter would appear from Mr. Wright's specimens to be mere forms of one species.

Cupuliferaæ. Most of the numerous Japanese Oaks are of Asiatic types. There is one, somewhat intermediate in foliage between *Quercus Ilex* and *Q. coccifera*, which seems to be new.†

Castanea Japonica, Blume, looks different from the common Chestnut, but exhibits no decisive characters. The smoother forms are more like the European than the American *C. vesca*; the canescent ones resemble our *C. pumila*. Both American Chestnuts are strictly confined to the Atlantic side of the continent; and *C. vesca* ap-

* EUPHORBIA GUILIELMI (sp. nov.): glaberrima; caule 1-2-pedali e rhizomate repente; umbella 5-6-fida, radiis dichotomis; foliis sessilibus subtus glaucescentibus integerrimis obtusis vel retusis, caulinis sparsis oblongis seu spathulato-oblongis basi attenuatis, involucribus conformibus sed paullo majoribus basi obtusioribus, involucellis imis triangulari-oblongis, ultimis acutis, omnibus longioribus quam latioribus; glandulis lunatis longe et subparallele bicornibus; capsula seminibusque glaberrimis. Yokuhama, Williams & Morrow. Simoda, Hakodadi.

† QUERCUS PHILLYRÆOIDES (sp. nov.): ramulis novellis (cum petiolis 2-3 lin. longis) gilvo-tomentellis; foliis coriaceis perennantibus ellipticis oblongisve rarius sub-obovatis obtusiusculis (1-2-pollic.) basi rotundatis ultra medium subserratis glabris, novellis subtus vel costa utrinque furfuraceo-tomentulosis, venis divergentibus inconspicuis; amentis masculis filiformibus laxis; floribus 4-5-andris; cupula crateriformi albido-tomentosa (squamis brevissimis arcte appressis) glande multo brevior. Simoda, Williams & Morrow (in flower). Tanegasima.

pears to be absent from Central Asia. But *C. chrysophylla* of Oregon and California, like one or two Californian Oaks, seems to be Asiatic in type.

The Japanese Beech (collected by Wright at Hakodadi) appears to belong to the European species, which, however, does not penetrate far into Asia. The genus is absent from Western North America, while *F. ferruginea*, very near the European species, abounds in the cooler parts of the Atlantic side of the continent. *Carpinus* is also wanting on the western side of America, but is represented by one species on the eastern, and by four in Japan. It is otherwise with the Hazels. *Corylus heterophylla* in Japan is a close representative of *C. Americana*, as *C. Sieboldiana* probably is of *C. rostrata*. Both American species range from the Atlantic to the Pacific, and both have analogues in Europe.

Sufficient materials are wanting for the comparison of the Japanese Birches with those of Eastern America, and with a species of Oregon. If I mistake not, *Betula carpinifolia*, Sieb. & Zucc., is identical with *Alnus* (*Alnaster*) *firma*, Sieb. & Zucc., and belongs to the latter genus. There are only two flowers to each scale, forming oval achenia, with pellucid wings of variable breadth; the scales are persistent, at length reflexed or widely spreading. *A. viridis* was detected in the northern part of Japan, as might have been expected.

Of Pines, only *P. Massoniana* and *P. densiflora* were collected, both of the *P. sylvestris* type. *P. parviflora* and *P. Korænsis* must be nearly related to *P. cembroides* of the Californian and Rocky Mountains, as well as to *P. Cembra* of the Old World. The Larch of Japan is more like the Siberian, European, and Oregon species than the eastern *Larix Americana*. *Abies Tsuga* of Japan is very like *A. Brunoniana* of the Himalayas on the one hand, and our Hemlock-Spruce, of both sides of the American continent, on the other. The remaining species have only a general resemblance to *A. Menziesii* of Oregon, and to our Black and White Spruces. *Glyptostrobus* (native only of China?) answers to our *Taxodium*. *Chamæcyparis pisifera*, Sieb. & Zucc., with one if not two other Japan species, is represented by *C. Nutkaënsis* in Western, and (less intimately) by *C. thyoides* in Eastern North America. But our *Thuja occidentalis* is much more like the Western American than the Japanese species; — all extra-European types. *Juniperus rigida*, however, is near to *J. communis*, which ranges round the world; and *J. Chinensis* is very near *J. occidentalis* of Oregon, *J. Virginiana* of the whole eastern part of America, and *J. Sabina* of the Old World. The Yews of Japan, Central Asia, Europe, Eastern North America, and Oregon, are similarly allied, — perhaps all derivative forms of one species. *Cephalotaxus*, Sieb. & Zucc., is peculiar to Japan, unless there is a Himalayan species.

Finally, *Torreya nucifera* of Japan, *T. Californica*, Torr., of the mountains of California, and *T. taxifolia*, Arn., of Florida, — the only species known, — appear to be so much alike, that, if they all belonged to one region, it is most probable they would never have been distinguished.

Aroideæ. The genus *Arisæma* is mainly divided between the Himalayo-Javan and Japanese region, and Eastern America, being unknown on the western side of either continent. We have three species in the United States east of the Mississippi; six are recorded from Japan, of which four are in the present collection, including what I take for Blume's *A. latisectum* (founded on the foliage only). But this is related to *A. Japonicum* rather than to *A. Thunbergii*; indeed, it might be regarded as a slender variety of the former species, with a green spathe and a long peduncle, except for the sterile appendage of the spadix, which is narrower and cylindrical, scarcely if at all thickened upwards.

In fresh-water marshes at Hakodadi, Mr. Wright gathered more advanced and complete specimens of an Aroideous plant, which had also been detected by Drs. Williams and Morrow, but was omitted in the published account of that collection. I may now state that the plant is an evident congener of *Dracontium Camtschatcense*, Linn. (the *Symplocarpus Kamtschaticus* of Bongard), which occurs on the northwest coast of America; indeed, it appears to differ only in having no spathe, unless the slender sheath of the scape, like that of *Orontium*, without any lamina, be so called. These plants do not belong to *Symplocarpus* (although they represent that genus and *Orontium* likewise — both strictly Eastern American genera), but constitute a well-marked new genus, between these two, and approaching *Dracontium* in the generally bilocular ovary. From our Skunk-Cabbage the new genus is distinguished by the elongated scape, the membranaceous spatha or sheath, the spiciform spadix, the membranaceous perianth, the horizontal orthotropous ovules, and probably by the nature of the fruit, which I have not seen mature.* I lay little stress upon the bilocular ovary, because one of the cells is occasionally abortive or wanting in the Japanese

* ARCTIODRACON, Nov. Gen.

Spadix nudus, scapum terminans, cylindricus. Flores hermaphroditi. Perigonium tetraphyllum, basi ovarii adnatum, phyllis obovatis membranaceis subconcavis. Stamina 4: filamenta plana: antheræ extrorsæ, biloculares, loculis ovalibus rima longitudinali ex apice fere ad basim dehiscentibus. Ovarium biloculare, rarius abortu uniloculare: stylus conicus, stigmatē depresso simplici terminatus. Ovula in loculis solitaria, dissepimento paullo supra basim inserta, horizontalia, orthotropa. Pericarpia carnosa, 1–2-sperma, in receptaculum commune spongiosum coalescentia, stylo crasso-conico acuto apiculata. Semina haud visa. — Herbæ paludosæ, boreali-Pacificæ, acaules; foliis magnis *Symplocarpi* cum scapo elongato cœtaneis e rhizomate crasso

plant, and because the ovary of *Symplocarpus* itself not rarely exhibits vestiges of a second cell.*

Nothing noteworthy occurs until we reach the *Orchidaceæ*. The species of this order were generally supposed to have a narrow geographical range, but some striking exceptions to this rule have recently been made known, such as the discovery of our *Tipularia discolor*, or of a species very like it, in the Sikkim Himalayas. The present expedition has detected in Japan two Orchids, which were until now supposed to be peculiar to North America east of the Mississippi, viz. *Liparis liliifolia*, and *Pogonia ophioglossoides*. The latter was gathered both at Simoda, in the southern part of Nippon, and at Hakodadi in the island of Jesso. In the United States, this species is commonly, if not always, accompanied by *Calopogon pulchellus*. In place of this, among the specimens gathered at Hakodadi, were mingled those of a new *Arethusa*,† — another genus equally peculiar to Eastern North America, where the beautiful *A. bulbosa* (the only species known before) also grows in the same bogs with *Calopogon* and *Pogonia ophioglossoides*, but flowers a month earlier.

The Japanese flora furnishes at least one instance of a species of this order which has apparently extended in the opposite direction, although with a continuous range, namely, *Orchis aristata* of Fischer, which is regarded as a mere form of the European

horizontalis ortis; spatha aut vagina radicali membranacea e spadice remota, limbo aut nullo, aut membranaceo colorato basi convoluta.

ARCTIODRACON JAPONICUM (sp. nov.): foliis ovalibus oblongisve; spatha nulla nisi vagina tenui basim scapi cingente. Hakodadi.

ARCTIODRACON CAMTSCHATICUM: spatha vaginante superne in limbum lanceolatum seu ellipticum acuminatum coloratum explanata. Dracontium, Linn. Symplocarpus, Bongard, Hook. Kamtschatka, Okotsk? Sitcha, N. Oregon.

* The ovule of *Symplocarpus* is rightly described by Dr. Torrey (in Flora of New York) as anatropous. It was by a mere oversight that it continued to be described as anatropous in the second edition of my Manual of the Botany of the Northern United States; for I had long ago ascertained the contrary.

As respects *Orontium*, Endlicher's description (drawn from Hooker's figures) of the ovule as "basilare, transversum, excentrice amphitropum," which has been implicitly adopted ever since, is correct in only one and the least important particular. For the ovule is anatropous and attached to the side of the cell. Also, the stigma is not minute, and the anther is essentially like that of *Arctiodracon*, only the cells are shorter, and opening only half-way down, so that the dehiscence seems to be transverse.

It is evident that there are no grounds for separating *Orontium* from the *Dracontieæ*, as Schott and Endlicher have done.

† ARETHUSA JAPONICA (sp. nov.): caule basi unifoliato; flore subnutante, nunc altero erecto; labello amplissimo obovato-dilatato apice subtrilobo nudo, lobo medio angustiore breviter producto integerrimo superne lamella parva instructo; gynostemio anguste alato, ala superne antheram cassidiformem haud superante. Hakodadi.

O. latifolia. It was long since discovered on the northwest coast of America, and has lately been detected in the northern part of Japan.

The fact perhaps is, that species of *Orchidaceæ* are not so much restricted in range as fastidious in their requirements, establishing themselves only where all the conditions of their well-being are very exactly fulfilled. Excepting those which grow in bogs, and only a part of these, the Orchideous plants of the United States are generally sparser or rarer in individuals than those of other families, or abound only in certain favored localities. From my own experience, I should judge that very few botanists have ever met with a dozen living individuals, in any one year, of *Liparis liliifolia*, *Tipularia discolor*, *Calypso borealis*, *Microstylis monophyllos*, or even of *Cypripedium arietinum*, or *Platanthera orbiculata*, &c. And if any of our species have once ranged continuously across this continent and beyond, we can readily conceive that the present differences in the character of the climate of the two sides would surely tend to obliterate them from the one or the other, while those adapted to survive in the Eastern United States would equally flourish in the similar climate of Japan.

Our *Aplectrum hyemale*, Nutt., of the Atlantic United States, also has its analogue in Japan, in the form of an interesting new species of Dr. Lindley's recent genus *Oreorchis*. Such poor flowers as I possess of *Aplectrum* certainly show no caudicle and gland to the pollen-masses, which are obliquely collateral; but in other characters, as in habit, *Oreorchis* and *Aplectrum* are much alike. Dr. Lindley has compared the Japan plant with the two Himalayan species, and with the very rare *O. patens* of Siberia (the particular habitat of which is apparently unknown), and has kindly indicated to me the characters which distinguish it from the latter.*

The detection of *Platanthera tipuloides* at the northern extremity of Japan gives occasion for some emendation of the specific character. Only the lower bracts exceed, or even equal, the "greenish-purple" flowers; the fleshy petals are rather oblong-linear than ovate, and the labellum, of similar texture, is still narrower. Thunberg's *Orchis Japonica* is not a *Platanthera*, but a *Habenaria*.† His *Serapias falcata* is, as I suppose,

* *OREORCHIS LANCIFOLIA* (sp. nov.): folio late lanceolato; vaginis scapi oblique truncatis appressis; racemo multifloro laxo; labelli unguiculati lobo intermedio apice crispo basi cuneato, lamellis 2 contiguis linearibus quam lobis lateralibus paullo brevioribus. Hakodadi.

† *HABENARIA JAPONICA*: caule folioso $\frac{2}{3}$ - 2-pedali; foliis inferioribus ovalibus oblongisve obtusis, superioribus bracteisque sensim angustioribus lanceolatis acutis; spica elongato-oblonga multiflora; ovario sessili apice angustato; floribus albis; sepalis lato-ovatis subconformibus; petalis oblongo-linearibus uninerviis; labello angustissime lineari crasso-carnoso integerrimo demum elongato filiformi dependente calcare gracili vix clavato apice acuto 2 - 3-plo brevior; retinaculo amplo lineari-oblongo squamæformi. Hakodadi.

only the *Cephalanthera ensifolia*, to which Dr. Lindley has already referred all the Indian *Cephalantheræ*. We have, in the collection from Hakodadi, specimens quite like a depauperate form of the European *C. ensifolia*, and from Simoda a large variety (as I must needs regard it) with all the lower flowers even more leafy-bracted than in Wight's figure of *C. acuminata*, the like of which Dr. Lindley had never seen. The labellum, likewise, is rather more saccate at the base, and the epichilium smoother. Still, the few specimens gathered exhibit such transitions towards the ordinary form, that I cannot hesitate to unite them. Very different from this, and a very well-marked species, is my *C. Japonica*, to which I had formerly adduced Thunberg's *Serapias falcata*, with some doubt. I should now refer to it Thunberg's *Serapias erecta*; yet the flowers of that plant are said to be white, and, as represented, are much smaller than those of *C. Japonica*.*

My *Epipactis Thunbergii* (*Serapias longifolia*, Thunb.) has not been again collected. It resembles more than any others *E. veratrifolia* of the Himalayas, and *E. Americana*, which ranges from Oregon to Texas and Mexico, and is the sole representative of this European and North Asian genus in the New World.

Finally, there are one or two specimens of a *Cremastra*, with unopened flower-buds, which I had supposed to be Blume's *Hyacinthorchis variabilis*; but, not to speak of the lancet-shaped process on the lip, (since the roundish, shrivelled process represented in Blume's figure may not be normal,) the column is more slender, almost filiform, and at the summit abruptly dilated into a very remarkable, semi-umbraculiform, stigmatiferous body, into the hollow of which, in the bud, the process of the lip is deeply inserted.†

* CEPHALANTHERA JAPONICA (Gray in Perry, Jap. Exped. 2. p. 319, excl. syn. Thunb.): foliis amplexicaulibus ovato-oblongis subacuminatis, summis lanceolatis; bracteis brevissimis; floribus 2-7 luteis subpedicellatis; labello sepalis petalisque ovalibus obtusissimis brevior, hypochilio sacco conico porrecto quasi calcarato, epichilio latissimo (bis latiore quam longo) repando-subtrilobo imberbi plurilamellato, lamellis centralibus 3-5 eximiiis; anthera super stigma sessili. *Serapias erecta*, Thunb. *Fl. & Ic. Pl. Jap. t. 4.* Simoda.

† CREMASTRA MITRATA (sp. nov.): folio oblongo; vaginis scapi 2 spathaceis laxis; bracteis lanceolatis subacutis; gynostemio fere filiformi sub stigmate in corpore hinc planum deltoideo-rotundum, versus labellum cavum mitræforme vel umbraculiforme, appendicem labelli oblongam acutatam planam in alabastro claudentem, abrupte dilatato. Hakodadi.

In the Bonin Islands, Mr. Wright gathered a *Luisia* (*L. brachycarpa*, C. Wright), certainly different from the Oceanic species, and probably no less so from *L. teres*, on account of its short-oval fruit; but the blossoms are still unknown. On one of the islands between Japan and the Loo Choo Islands was gathered a new, small-flowered *Aceras*, near the Himalayan *A. angustifolia*, viz.:—

ACERAS LONGICRURIS (C. Wright, sp. nov.): spica densiflora; petalis angusto-linearibus obtusis; labello deflexo sepalis plus duplo longiori paullo ultra medium fissis cum lacinula intermedia brevi; cæt. *A. angustifoliae*. Katonasima.

Iridaceæ are represented in the collection by *Iris setosa*, Pall., *I. lævigata*, Fisch. (probably Thunberg's *I. versicolor*), *I. orientalis*, Thunb.? and a low species which appears to be new.*

Passing to the variously connected tribes which are probably to constitute one great order, *Liliaceæ*, I notice a well-marked new species of *Smilax*,† — probably Thunberg's *S. Pseudo-China*, but not that of Loureiro. It should be compared with *S. Sieboldii* of Hasskarl, which is enumerated as from Japan, but not described in any work known to me. The species which I had named *S. Japonica* in Perry's Expedition is evidently the Linnæan *S. China*, and perhaps Kunth's *Coprosmanthus Japonicus* also. I find, indeed, only single ovules in each of the three cells; but Kæmpfer states that the seeds are four, five, or six, and figures the latter number. I have seen nothing answering to Kunth's *Heterosmilax Japonica*, nor to his *Coprosmanthus consanguineus*; the latter may perhaps be one of the forms of the Eastern North American *S. (Coprosmanthus) herbacea*. *Smilax* had appeared to be absent from the western portion of the United States, although so abundant in the eastern; but Hartweg found a species, allied to *S. rotundifolia*, in California.

Paris is a strictly Old-World genus, and our *Medeola* is its analogue in Eastern North America. From Hakodadi and the vicinity, the expedition obtained Chamisso's rare *P. hexaphylla*, with seven or eight leaves, — resembling those of *Medeola Virginica*, the larger ones five inches long, and the cusp of the stamens considerably shorter than the anther: also a new species, closely resembling the European and Siberian *P. quadrifolia*, but apetalous, with rather broader leaves, and with muticous anthers! The specific name chosen for it is intended to suggest the resemblance.‡ The Japanese

* *IRIS GRACILIPES* (sp. nov.): caulibus e rhizomate gracili repente pluribus (spithamæis et ultra) gracilibus 3–4-foliatis folia radicalia lineari graminea subæquantibus; pedunculis filiformibus folia caulina eos fulcrantia æquantibus; flore intra spatham scariosam monophyllam sessili solitario; perigonii cærulei tubo ovario brevi trigono triplo longiore, laciniis obcordato-oblongis, exterioribus lamella tenui glabra cristatis quam interioribus breviter unguiculatis duplo majoribus; stigmatibus bifidis laciniatis. Hakodadi.

† *SMILAX STENOPETALA* (sp. nov.): inermis, glabra; caule tereti scandente; foliis amplis late ovalibus seu ovatis vix subcordatis ex apice obtusissimo vel retuso acuminulatis, concoloribus submarginatis triplinerviis cum nervis 2–4 lateralibus inconspicuis reticulatis; pedunculis brevibus sæpius compositis; umbellis multifloris; perigonii rubelli phyllis 3 interioribus (petalis) ligulatis sursum attenuatis carinato-uninerviis post anthesin revolutis exteriora oblonga (sepala) et filamenta filiformia ad æquantibus; ovarii loculis (sæpius 3) uniovulatis; baccis purpureis. Kagosima Bay, Kiu-siu; Hakodadi.

‡ *PARIS TETRAPHYLLA* (sp. nov.): foliis quaternis sessilibus rhomboideo-ovatis acuminatis; flore tetrasepalo apetalo octandro; antheris prorsus muticis sepalis ovato-lanceolatis stylisque 4 basi modice connatis dimidio brevioribus. Hakodadi, &c.

Trillium now occurs in a more advanced state: I still regard it as a mere variety of the Alleghanian and Canadian *T. erectum*, from which it differs only in its generally more dilated leaves (the largest 6 or 7 inches broad), and proportionally shorter peduncle.* The relations of our Eastern American species with those of the western side of the continent should be scrutinized anew. Our *T. cernuum*, towards its north-western limit in British America, appears to elevate and lengthen its peduncle until it is hard to distinguish, in dried specimens, from the white variety of *T. erectum*. And this latter species is apparently reproduced in Oregon and California (both with white and with purple petals) as *T. ovatum*, Pursh, which in Northern Oregon and in Kamtschatka becomes Pursh's *T. obovatum*, which again is probably a northern form of *T. grandiflorum*. *T. sessile* reappears in California, under the same variety of forms as in the Alleghany region; and the characters of *T. recurvatum*, Beck, of Illinois and Missouri, are carried to an extreme in Pursh's *T. petiolatum*, of the interior of Oregon.

Lindley's *Asparagus lucidus* (*A. falcatus* of Thunberg, but hardly of Linnæus) was gathered at Simoda; and from Hakodadi there is an undescribed species, unless it be Kunth's *A. schoberioides* of Java.†

There would seem to be a mixture of European and of Eastern American species of *Polygonatum* in Japan. Of the former there is *P. vulgare* (one form of which I suppose is *P. Japonicum*, Morr. & Decaisne); of the latter, a plant which I cannot distinguish from the American *P. giganteum*. Both were found at Hakodadi; and in the same neighborhood, as also at Simoda, were gathered the true European *P. multiflorum* (the filaments villous with long, many-jointed hairs), and some forms which apparently connect the Caucasian *P. polyanthemum* and the Eastern American *P. biflorum* with the same species. To this probably belong Kunth's *P. Thunbergii*, and what I formerly took for *P. Japonicum*. There were also gathered at Simoda two specimens, which may possibly be a peculiar form of *P. multiflorum*; but their long and narrow falcate leaves (4 to 7 inches long, and very gradually tapering from near

* *TRILLIUM ERECTUM*, Linn.; var. *JAPONICUM*: pedunculo foliis amplissimis dimidio brevior; petalis albidis vel purpureis. *T. erectum*, var. *album*, Gray in Perry, *Exped.* 2. p. 320. Hakodadi.

† *ASPARAGUS WRIGHTII* (sp. nov.): herbaceus, erectus e rhizomate crasso horizontali, glaberrimus; ramis adscendentibus ramulisque striato-angulatis; foliis squamæformibus scariosis, caulinis basi subcalcaratis inermibus; cladodiis setaceis acutissimis ut videtur compressis subfalcatis (5–10 lin. longis) binis ternis quinisve; floribus masculis cum pedicello brevissimo articulatis; antheris cordato-didymis haud apicatis filamentis lineari-bus 2–3-plo brevioribus. Hakodadi.

the rounded or obtuse base) are peculiar.* Like so many other amphigæan genera, *Polygonatum* is wanting in Western America. So also is *Convallaria majalis*, which, ranging through the whole breadth of the Old World, from Western Europe to Japan, is found in the New World only in the higher Alleghany Mountains south of Pennsylvania (the most northern known station is about lat. 37°), although the climate of all the northern part of our country seems well adapted to the species, since it flourishes and multiplies in gardens and grounds without the least care.

On the other hand, *Smilacina* (*Majanthemum*) *bifolia* extends around the world, but under three pretty well marked geographical varieties; — the European, which extends to Eastern Siberia; the var. *Kamtschatica*, which replaces the former on the Pacific Siberian coast, in Japan, and in North America west of the Rocky Mountains; and the var. *Canadensis*, throughout all the northern part of this country east of the Mississippi and the Rocky Mountains. But it is curious to notice that *Smilacina stellata*, which extends across the whole breadth of the American continent, and even occurs in Norway, is absent from Asia, unless *S. Dahurica* be identical with it; while *S. trifolia*, here confined to the northeastern part of America, and unknown in Europe, also inhabits Siberia, and probably Japan also, as it has been detected on the shores of the Okotsk Sea. And *S. racemosa*, which ranges across the whole breadth of North America, is replaced in Japan by *S. Japonica*, Gray, the characters of which are confirmed by additional specimens. The Himalayan species upon which Kunth founded his genera *Iocaste* and *Medora* appear to be strict congeners of *S. racemosa* and *S. Japonica*.

Another American type, repeated in Japan and Northeastern Asia, is *Clintonia*, Raf. Fruiting specimens gathered in the northern part of Japan doubtless belong to *C. Udensis*, Trautv. & Meyer, from the adjacent Okotsk region. This species and *C. Andrewsiana*, Torr., of California, are somewhat intermediate between the two Eastern American species, of which the northern one, *C. borealis*, is replaced by *C. uniflora* west of the Rocky Mountains. The Himalayan *C. alpina* I have not seen.

Good specimens were obtained of *Disporum sessile*, which varies considerably in foliage, but appears to keep distinct from *D. pullum* and from the Himalayan *D. Pit-sutum*; also, of my *D. smilacinum*, the character of which now needs some emendation, especially as to the ovules. These, in the present specimens, are two in each cell, as

* *POLYGONATUM FALCATUM* (sp. nov.): glabrum; caule tereti 1–2½-pedali; foliis alternis elongato-lanceolatis sensim a basi ad apicem angustatis falcatis breviter petiolatis, nervis validioribus 3; pedunculis brevibus 2–6-floris; floribus flavidis; filamentis subclavatis glanduloso-scabris. Simoda.

in the genus. The anther is extrorse in its attachment, but the line of dehiscence slightly introrse. This is the case, in a more decided manner, in *Medeola*. It becomes abundantly evident that the insertion of the anthers, and the partial or complete separation of the styles, are too artificial and (through gradations) too indefinite characters for warranting the ordinal separation of the *Uvulariæ* from the *Convallariæ*. It would appear that the order *Liliaceæ* must be opened, according to Mr. Bentham's indications, to receive not only these plants, but the *Trilliaceæ*, *Melanthaceæ*, &c., and I suspect even *Smilax* itself, notwithstanding its orthotropous ovules.*

Streptopus amplexifolius, DC., was gathered at Cape Soya. This is a truly northern plant in the New World, extending from Hudson's Bay, Newfoundland, and New England to our northwestern coast and islands; thence to Kamtschatka and Japan. It has not been detected elsewhere in Asia, nor is it known in Europe north of Saxony and Silesia, whence it ranges southward to the Pyrenees, the mountains of Calabria, and those of Hungary. So its geographical position in Europe is analogous to that of the Lily of the Valley in the United States of America. Our *Streptopus roseus*, Michx. doubtless inhabits the northern part of Japan, since it occurs in the Aleutian Islands on the one side, and in the Okotsk district on the other, where it is clearly Ledebour's *Smilacina streptopoides*!

Although *Lilium maculatum* of Thunberg, which I have not seen, would appear to represent our *L. Canadense* and its near allies, yet most of the Japanese species are of European or Himalayan types. A Lily which was abundantly met with on the coast of Jesso may be equally well referred to *L. spectabile*, Link., or to the Linnæan *L. bulbiferum*, of which the former is apparently a mere variety. A single specimen, and that with an unopened flower-bud only, was collected of a Lily, so well marked in character that it may be named and described, even from such incomplete materials.† Drs. Williams and Morrow gathered, at Simoda, a specimen of *Gagea triflora*, R. & S., hitherto collected only by Tilesius,—the habitat unknown to Ledebour, probably on the eastern coast of Siberia, or in Kamtschatka. The plant connects *Loydia* with *Gagea*: flowers apparently white, destitute of folds or pits at the base of the segments, and with only about six ovules in each cell.

* Ledebour and some other botanists have adopted Endlicher's error in considering the ovules of most *Convallariæ* to be orthotropous.

† *LILIUM? MEDEOLOIDES* (sp. nov.): glabrum; bulbo granulato; caule simplicissimo longe nudo ad apicem folia plura (pseudo-)verticillata gerente et pedunculo superne bracteato unifloro terminato; perigonii in alabastro parvi phyllis oblongis dorso carinatis nudis apice calloso intus barbulatis. Genitalia omnino *Lilii*. Hakodadi.

Allium Schœnoprassum abounds in the north of Japan, as might be expected. *A. Thunbergii* is the Japanese analogue of *A. Canadense*; as is *A. Victorialis* (from the northern part of Japan, and Kamtschatka, ranging thence to Eastern Europe) of the Eastern American *A. tricoccum*.

Fluggea Japonica of Richard, which probably includes more than one of Kunth's species, abounds on the shores of Kiu-siu, &c. None of the other *Ophiopogoneæ*, or of the *Aspidistreæ* of Japan, were met with. I have not seen *Roxburghia Japonica* of Blume; perhaps it is not indigenous to Japan.

I now come to a very interesting plant, of which two or three specimens were gathered on Cape Romanzoff, in fruit only, but with all the parts of the flower so far persistent that the whole structure has been made out, and secured by drawings. It may be briefly described as a *Helonias* with few flowers, a single and slender style surmounted by a depressed-capitate stigma, and the seeds appendaged only at the hilum.* Two things are noteworthy respecting this plant:—1. Its conformity to the rule, if it may be so called, that peculiar Eastern North American types have their counterparts in Japan. For the original and only true *Helonias*—one of the rarest plants in the United States—is found only in a few localities in New Jersey, the adjacent parts of Pennsylvania and Delaware, and in Virginia. 2. Its single style, with even the stigmas united into one, annihilates one of the two diagnostic characters of the order *Melanthaceæ*. There is reason for supposing that the common *Chamælirium luteum* (*Veratrum luteum*, Linn., *Helonias dioica*, Pursh.), of the Atlantic United States, likewise has a Japanese counterpart in the *Melanthium luteum* of Thunberg, or *Helonias? Japonica*, R. & S.; but this plant has not been rediscovered.

Veratrum nigrum, exactly the European and Siberian plant, was also collected. Our

* HELONIOPSIS, Nov. Gen.

Flores hermaphroditi. Perigonium sexphyllum, fere herbaceum, phyllis lineari-spathulatis persistentibus. Stamina 6, imæ basi perigonii phyllorum inserta, eadem subsuperantia: filamenta filiformia, persistentia: antheræ. oblongo-sagittatæ, sinu profundo affixæ, extrorsæ, biloculares, longitudinaliter dehiscentes. Stylus filiformis, e sinu ovarii profundo longe exsertus: stigma peltato-capitatum, integerrimum. Capsula chartacea, usque ad medium obcordato-triloba vel biloba, lobis divergentibus, trilocularis, loculicida. Semina in placenta brevi axili plurima, anatropa, globoso-ovalia; testa subcrustacea conformi, pelliculo reticulato tenui arcte obvoluta, apice nuda, ad hilum in carunculam fungosam semine vix angustiore producta. Embryo in basi albuminis carnosi subinclusus, eodem plus dimidio brevior, cylindraceus, super radiculam brevissimam quasi truncatam leviter constrictus.—Herba paludosa, facie omnino *Heloniadis bullatæ*, foliis tamen brevioribus, floribus in racemo paucis majoribus.

HELONIOPSIS PAUCIFLORA. Cape Romanzoff, northwestern extremity of Jesso.

American *V. viride* (reproduced in Oregon as *V. Eschscholtzii*) is probably in Japan also, since Middendorff gathered it on the Okotsk coast.

Lambert's *Aletris Japonica* was met with by Mr. Wright only upon Katonasima and the Loo Choo Islands; it is a close congener of our two species of the Atlantic United States, but has more grass-like leaves, and pinkish flowers.

Juncaceæ. The *Luzulæ* of Japan, and *Juncus effusus*, are species found all round the northern hemisphere. *Juncus xiphioides* belongs to Japan and the western coast of North America.

*In passing, we may note the absence from Japan of *Xyris*, and especially of *Eriocaulon*, — two types (otherwise mostly tropical) which have wandered northward only along our Atlantic coast, even to Canada, and in some unusual way (probably by the Gulf Stream) contributed one species (*E. septangulare*) to the western shores of the British Islands.

Cyperaceæ. There is a new *Eleocharis*,* resembling *E. palustris*, but with larger and more compressed achenia, crowned by a very large, cellular-spongy, cap-shaped tubercle, closely applied to the summit of the achenium by a concave base; the hypogynous setæ delicate and fragile, or in many flowers apparently obsolete. It should be compared with Steudel's *E. mitracarpa*, from Persia, the tubercle of which is said to be squamose and minutely hispid. The only other plants of this order requiring notice are the *Carices*, which, like those of Williams and Morrow's collection, have been examined by Dr. Boott, who sums them up as follows: — "I have seen thirty-seven species of *Carex* from Japan, of which twenty are peculiar to that country, and seventeen common to other countries, viz. three to Europe (*C. præcox*, *polyrrhiza*, *pilulifera*); † two to North America (*rostrata* and *stipata*); five to Europe and North America (*remota*, *stellulata*, *muricata*, *vesicaria*, and *filiformis*); one to Northeastern Asia and the northwestern coast of America (*macrocephala*); one to Kamtschatka (*longerostrata*); two to India (*Doniana* and *Royleana*); one to Australia (*Gaudichaudiana*); one to Australia and Chili! (*pumila*); and one to the Sandwich Islands (*Wahuensis*). Peculiar to Japan, *C. nana*, *anomala*, *picta*, *incisa*, *transversa*, *papulosa*, *parciflora*, *confertiflora*, *micans*, *Ringgoldiana*, *rigens*, *villosa*, *dispalata*, *pisiformis*, *Morrowi*, *excisa*, *conica*,

* *ELEOCHARIS PILEATA* (sp. nov.): cæspitosa; rhizomatibus filiformibus vix repentibus, culmis vaginis et spica *E. palustris*; glumis ovatis obtusis rufis margine leviter scariosis; stylo alte bifido; tuberculo celluloso-suberoso albo mitriformi vel pileiformi obtuso lævi achenium obovato-lenticulare obtusangulum læve pallidum longitudine ac latitudine subæquante; setis 4–6 fragilibus nunc achenio æquilongis nunc evanidis. Hakodadi, in fresh-water marshes.

† All likewise in Kamtschatka, &c., fide Treviranus in Ledeb. Flora Rossica.

puberula, monadelpha (cernua, Herb. Par.)." One of these, *C. Ringgoldiana*, was gathered on Ousima only, which we rank rather with the Loo Choo Islands; but it probably occurs in Japan proper also. Appended are the characters of the new species from Japan, and of a few from the Loo Choo Islands, as named and described by Dr. Boott.* Points of relationship with America would appear on studying the affinities

* "CAREX NANA (Boott, sp. nov.): spica simplici androgyna apice mascula oblonga olivaceo-ferruginea nuda; stigmatibus 3; perigyniis ovatis turgidis inæqualiter triquetris sensim rostellatis (ore integro) obscure 2-3-nervatis glabris horizontaliter patentibus resinoso- demum ferrugineo-punctatis deciduis squama ovata obtusissima mutica ferruginea margine albo-hyalina medio pallida longioribus. — Aff. *C. capillaceæ*, Boott, Ill. Car. p. 44, t. 110. Omnibus partibus major; culmo altiori (8-10-poll.) lævi; foliis latioribus brevioribus; spica pauciflora; squamis nunquam ciliatis; perigyniis duplo majoribus turgidis, nervis paucioribus. Hakodadi.

"CAREX PICTA (Boott, sp. nov.): spicis 2-3 pedunculatis ferrugineis, terminali mascula gracili erecta, fœmineis 1-2 longe setaceo-pedunculatis evaginatibus nutantibus subremotis viridi-ferrugineo pictis; bractea culmo paullo longiori; stigmatibus 2; perigyniis ellipticis utrinque acutis brevissime aut vix rostellatis (ore integro) compressis undique papilloso-asperulis superne ad margines nunc parce dentatis enerviis aut leviter nervatis ferrugineis apice viridibus squama elliptica obtusiuscula longiuscule hispido-cuspidata subæquilata viride ferruginea basi pallida nervo viridi paullo longioribus (cuspidate) brevioribus. — A *C. cryptocarpa*, Meyer, differt spicis fœmineis 2 ferrugineis nec apice masculis; squamis cuspidatis; perigyniis majoribus; culmo scabro. A *C. macrochæta*, Meyer, stigmatibus 2; spicis longe pedunculatis; squamis masculis obtusis nervo vix excurrente, fœmineis brevius cuspidatis; perigyniis papillosis margine dentatis; fibris radicalibus lignosis nec villosis. Hakodadi.

"CAREX CONFERTIFLORA (Boott, sp. nov.): spicis 6 alternatim subcontiguis erectis, terminali mascula cylindrica gracili ferruginea, reliquis fœmineis fusco-olivaceis concoloribus oblongo-cylindricis obtusis densifloris, superioribus sessilibus, summa abbreviata apice mascula, infima vaginata brevi-exserte pedunculata; bracteis inferioribus late foliaceis culmum superantibus; stigmatibus 3; perigyniis triquetro-ovatis ventricosis rostratis (ore ferrugineo membranaceo margine hyalina oblique secto demum bilobo) glabris nervatis confertis membranaceis squama lineari longe attenuato-acuminata ferruginea nervata longioribus triplo latioribus. — Affinis *C. olivaceæ*, Boott, Ill. Car. p. 56, t. 149: differt spicis paucioribus multum brevioribus densifloris obtusis nec apice masculis; bracteis culmoque multum brevioribus; squamis fœmineis attenuatis nec longe cuspidatis. Hakodadi.

"CAREX PAPULOSA (Boott, sp. nov.): spicis 3 oblongis remotis, terminali mascula lanceolata gracili longe pedunculata erecta, reliquis fœmineis olivaceis exserte pedunculatis nutantibus distantibus; bracteis culmo brevioribus; stigmatibus 3; perigyniis triquetro-lanceolatis in rostrum sensim longe acuminatis (ore obliquo integro membranaceo) superne vacuis glabris crebre nervatis olivaceis squama ovata obtusa valide cuspidata ferruginea medio viridi-nervata sub lente papulosa angustioribus longioribus. — A *C. villosa*, Boott, differt, spicis nutantibus remotis; squamis medio papillosis nec emarginatis; perigyniis ore integro; culmo foliisque glabris. A *C. Jackiana*, Boott, Ill. Car. p. 9, t. 25 differt, spicis fœmineis 2 remotis longe pedunculatis nutantibus simplicibus; bracteis brevioribus; squamis masculis muticis, fœmineis firmis latioribus. Hakodadi.

"CAREX PARCIFLORA (Boott, sp. nov.): spicis oblongis paucifloris laxis pallidis, terminali mascula abbreviata oblique gracillima breve pedunculata, reliquis fœmineis erectis laxifloris, suprema masculæ arete contigua,

of some of these Carices. For instance, *C. picta* is compared with *C. cryptocarpa* and *C. macrochæta*, both natives of the northwestern coast of America; *C. parciflora*, with the Eastern American *C. laxiflora*; *C. rigens*, with our *C. granularis* of the same region; *C. incisa*, with *C. lenticularis*, Michx.; *C. dispalata*, with *C. amplifolia* of Oregon, which is allied to the Eastern American *C. scabrata*, &c. And as many other species have close Himalayan representatives. So *C. Bongardi*, Boott, (which Mr.

inferioribus remotis exserte pedunculatis; bracteis superioribus culmo paullo longioribus; stigmatibus 3; perigyniis ovato-triquetris sensim in rostrum breve acuminatis (ore integro obliquo pallido) olivaceis glabris oblique divergentibus nervatis squama ovata alba nervo tenui viridi excurrente latioribus longioribus. — A *C. papulosa* differt spica mascula abbreviata obliqua, fœmineis erectis laxifloris; perigyniis minoribus; squamis albis tenuiter cuspidatis; culmo pedunculisque ancipitibus. A *C. Jackiana*, spicis laxifloris remotis, mascula obliqua; perigyniis brevioribus, nervis paucioribus, ore integro; culmo debili. Ad. *C. laxifloram*, Lam., proprius accedit: differt inflorescentia breviori; spica mascula obliqua, fœmineis brevioribus; perigyniis basi minus productis olivaceis, ore integro, nervis paucioribus; squamis acutis; rhachi recta; foliis tricostatis. Hakodadi.

“*CAREX RIGENS* (Boott, sp. nov.): spicis 3–4 oblongo-cylindraceis approximatis erectis, terminali mascula subsessili sæpe obliqua, reliquis fœmineis fusco-olivaceis, superioribus masculæ contiguis, infima subremota exserte pedunculata laxiflora; bracteis foliaceis culmo longioribus; stigmatibus 3; perigyniis ovatis ventricosius obtuse triquetris rostratis glabris vel rostro parce dentato (ore membranaceo albido bifido, laciniis scabris) crebre valide nervatis fusco-olivaceis divergentibus squama ovata acuta vel truncata longe valideque cuspidata albida nervo viridi latioribus longioribus vel cuspidate brevioribus. — Affinis *C. granulari*, Muhl.: differt spicis fusco-olivaceis laxis; perigyniis rostro bifido longiori. Hakodadi; Ousima.

“*CAREX MICANS* (Boott, sp. nov.): spicis 3–4 cylindricis stricte erectis, terminali mascula sessili gracillima castanea vix apicem fœminæ superioris attingente, reliquis fœmineis teretibus fusco-olivaceis, superioribus 1–2 masculæ arcte contiguis, infima remota longe exserte pedunculata, bracteis vaginatis culmum longe superantibus; stigmatibus 3; perigyniis ovalibus plano-triquetris rostrellatis (ore integro ferrugineo) læte demum fusco-viridibus papillis micantibus undique asperatis costato-nervatis squama oblonga obtusa rarius acuta mutica vel nervo excurrente alba medio læte viridi demum ferruginea latioribus longioribusque. — Sesquipedalis: folia 2 lin. lata, culmo breviora. Simoda.

“*CAREX RINGGOLDIANA* (Boott, sp. nov.): spicis 4–5 cylindricis erectis gracilibus, terminali mascula capillari inconspicua laxiflora sessili castanea, fœmineis superioribus breviori, reliquis fœmineis olivaceis, superioribus 1 vel 2 masculæ arcte contiguis sessilibus vel insertis, inferioribus remotissimis laxifloris breve exserte pedunculatis, infima subradicali; bracteis foliaceis elongatis, superioribus culmo paullo longioribus; stigmatibus 3; perigyniis oblongo-ovatis obtuse triquetris turgidis tenuiter acuminato-rostratis (rostro decolori, ore leviter emarginato-lobato ciliato) olivaceis undique crebre nervatis squama parva ovata acuta mutica albida ciliata vel mucronata latioribus triplo longioribus. — Habitus *C. granularis*, Muhl. Ousima.

“*CAREX DISCOIDEA* (Boott, sp. nov.): spicis 3–4 parvis paucifloris congestis sessilibus pallidis, terminali mascula oblonga sæpe abbreviata inconspicua, reliquis fœmineis ovatis evaginatis, infima subinde paullo remota; bracteis culmo longioribus; stigmatibus 3; perigyniis ovalibus utrinque acutis (ore albido integro vel subemarginato) obtuse triquetris nervatis pubescentibus pallide viridibus squama alba acuminata acuta breve hispidocuspidata nervo viridi angustioribus brevioribus vel subæquilongis. — Habitus *C. Novæ-Angliæ*, Schw. A

Wright gathered abundantly at the Bonin Islands,) is nearly related to *C. aristata*, R. Br., of the Great Lakes and the Saskatchewan, which again (as *C. orthostachys*, Meyer, which is referred to it by Dr. Boott) ranges from Kamtschatka through Siberia to European Russia. *C. Bongardi*, by the way, is now ascertained by Dr. Boott to be the *C. Boottiana* of Hooker and Arnott (Bot. Beech. Voy. p. 273), the earliest published name, but singularly overlooked by Kunth, Boott, Steudel, &c. Meanwhile another *C. Boottiana*, from the Southern United States, has been published and beautifully illustrated, rendering it most desirable that the strict rule of priority should be waived in this instance, and that the Bonin species should retain the name of *C. Bongardi*.

The Japanese *Gramineæ* of this collection have been studied by that excellent agrostologist, Colonel Munro. He finds only one new species among them, but that is a most remarkable one, belonging as it does to a genus, *Ehrharta*, mainly South African, yet with a few Australian representatives.* The grass which I had formerly taken for *Trisetum cernuum*, Trin., is a form of *T. flavescens* according to Colonel Munro, —

C. puberula, Boott, differt, spicis perigyniisque ovalibus obtuse triquetris, nec subglobosis, minoribus; squamis acutis; foliis bracteisque angustioribus. A *C. leucochlora*, Bunge, et *C. Royleana*, Nees, spicis evaginatissimis minoribus; basi styli discoidea articulata, nec annulata. Loo Choo Islands.

"*CAREX SOCIATA* (Boott, sp. nov.): spica subelongata e spiculis 6 pallidis oblongo-cylindricis erectis, terminali mascula sessili, reliquis fœmineis ima basi parce masculis, superioribus masculæ arcte contiguis, inferioribus paullo remotis exserte pedunculatis; bracteis spicis suis brevioribus; vaginis subturgidis scabris; stigmatibus 3; perigyniis ovali-triquetris basi productis rostratis bidentatis valide nervatis pubescentibus pallide viridibus squama oblonga truncata vel emarginata brevi hispidocuspidata albida æquilata longioribus. — A *C. Chinensi* differt achenio ad facies (nec angulos) tumente, apice insigniter annulato; inflorescentia breviori; squamis fœmineis brevioribus latioribus brevius cuspidatis; perigyniis minus divergentibus; nec spicis comosis. Loo Choo Islands." Boott, Mss.

* *EHRHARTA CAUDATA* (Munro, sp. nov.): racemo simplici subcaudato; pedicellis hispidis; floribus neutris inæquilongis subulatis 5–7-nerviis quam glumis inæqualibus acutissimis trinerviis fere duplo longioribus, hermaphrodito palea inferiori longe aristata; staminibus 3. Hakodadi, on the sides of mountains near rivulets.

"A very distinct species, in some respects approaching *E. avenacea*, Willd. (of Isle Bourbon). Stems stoloniferous, a foot and a half high, with three joints. Leaves 6 to 12 inches long, narrowly linear, scarcely 3 lines broad, almost smooth. Sheaths smooth or slightly hairy: upper ligules almost acute; the lower obtuse, slightly tinged with black. Raceme 6 inches long, slender, slightly bent to one side. Pedicels about a line long, almost deflexed. Lowest neutral flower $4\frac{1}{2}$ lines, the upper $6\frac{1}{2}$ lines, in length; smooth, except on the keels. Lower palea of the perfect flower about an inch long, inclusive of its remarkable awn-like termination, inconspicuously fringed; the upper palea fringed on the two nerves, which are very close together. Styles 2, distinct to the very base. — This is perhaps Thunberg's *Alopecurus caudatus*." W. Munro, Mss.

who refers to the latter species the *T. Ruprechtii* of Grisebach, *T. Sibiricum* of Ruprecht, *Bromus bifidus* of Thunberg, and *B. avenaeformis* of Steudel, and distinguishes *T. cernuum* of Northwestern America by its bearded ovary. The inflorescence of the latter is also much looser, and the spikelets mostly smaller. It will be seen, by the accompanying tabular view, that most of the Grasses in this collection are of northern temperate types, and of widely diffused species. There are others in the southern part of Japan of a different character, most of them well-known Indian or Malayan species.

The *Filices* of the collection have been critically studied by Mr. Eaton, of New Haven. The characters of a few new species are published in the Proceedings of the American Academy, 4. p. 110. The distribution of those species which occur in other portions of the northern temperate zone is appended to the tabular view. The specially American species are *Adiantum pedatum*, which also occurs in Oregon; and *Osmunda cinnamomea*, which does not.* One specially European form occurs, viz. *Athyrium fontanum*. Those which occur all round the world are *Athyrium Filix-fœmina*, *Lastrea dilatata*, and *Polypodium vulgare*; while *Lastrea Filix-mas* ranges round the Eastern continent, but is wanting throughout America, and *Struthiopteris Germanica* is apparently absent from Western America only. *Blechnum Spicant* is more interrupted, being unknown through the whole breadth of Asia east of the Caucasus, but found in Kamtschatka, Japan, and on the northwestern coast of America, and again wholly absent from the rest of the New World. *Osmunda regalis*, on the other hand, is apparently absent from all Western America, although (in the form of *O. spectabilis*) very common in the Atlantic United States: it appears to be absent also from all Northern Asia, but occurs in the Himalayas, according to Sir William Hooker both in the ordinary state, and with sterile and fertile fronds separate. Since the latter is, then, just the same as *O. Japonica*, the range of *O. regalis* under this form would extend to China and Japan. We may expect some day to receive from Japan or Mantchuria *O. Claytoniana* (*O. interrupta*, Michx.), a species so far as now known strictly divided between Eastern North America (from Newfoundland and Pennsylvania to Lake Winipeg) and the Eastern Himalayas. Surely there can be no question of the complete distinctness of this species from *O. cinnamomea*, however each may vary in respect to the sterility or fertility of the fronds.

* While this sheet is under revision, a letter from Dr. Hance, of Hong Kong, informs me that, among the plants which he has received from the northern part of Japan and the coast of Mantchuria, occurs another and most peculiarly American Fern, viz. *Onoclea sensibilis*. This is a wide-spread species in the Atlantic United States, extending south to Florida and to Texas, and northwest to the valley of the Saskatchewan.

Among the few *Lycopodiaceæ* the only thing remarkable is the discovery of our Eastern American *Lycopodium lucidulum*, Michx., in Japan. Its known northwestern limit before was the valley of the Saskatchewan. Our *L. dendroideum*, however, which ranges westward to the northwest coast, was already known in Kamtschatka and Eastern Siberia.

The *Musci* of the collection are now under examination by Messrs. Sullivant and Lesquereux. They exhibit a similar mixture of North American and of European species. The *Lichenes*, which Professor Tuckerman, and the *Algæ*, which Professor Harvey, are now studying, will probably afford interesting geographical data. The *Fungi*, upon which Messrs. Berkeley and Curtis have drawn up a report, are too cosmopolitan for our purpose.

In the following table I have endeavored to enumerate the species, or at least the genera, of the Japanese plants known to me, which have particular relatives in other and distant parts of the northern temperate zone. Tropical or subtropical forms, of which there are a few in the southern districts, are omitted. So are all the types peculiar to the Japano-Chinese region, or which have near relatives only in tropical or southern parts of the world, and all weeds or other plants which may owe their present diffusion to man's agency. Some species enumerated in the Japanese column which have not fallen under my observation, are distinguished by being enclosed in parentheses.

A very few species are mentioned which as yet have been found only on the adjacent mainland, as *Sedum sedoides* on the Chinese, and *Streptopus roseus* on the Okotsk coast.

In parallel columns on each side, I have added the identical, analogous, or nearly related species, so far as known to me, or for which there is good authority, indigenous on the one hand to Western North America (i. e. to the district west of the Rocky Mountains, or at least west of the great plains of their eastern slope) and to Eastern North America; on the other hand, to Central and Northern Asia, and to Europe.

For Northern Asia, Ledebour's Flora Rossica is a sufficient guide. Only those species are mentioned in this column which range westward as far as the Davurian, or eastward as far as to the Altaic region. For the central or Himalayan region the means of comparison available to me are necessarily very imperfect, until Drs. Hooker and Thomson have proceeded farther with the Flora Indica and the Præcursores, and with the distribution of their great collections, of which I am generously allowed a share. I cannot pretend to have examined many of the Himalayan species here mentioned; nor am I able to estimate their relationship to their Japanese congeners at all critically. So that I have generally cited only identical or apparently closely repre-

sentative species. This column may hereafter be much better filled; and in a more particular view the Himalayan species should be distinguished from the Siberian by some mark. The comparisons made in the European, and especially in the two American columns, are naturally more complete, and of higher critical value.

To a certain extent I have attempted to express degrees of relationship, by printing identical and closely related species in italic type. The identical species in any or all of the regions are made evident by the repetition of the specific name. The other italicized names indicate species so like the Japanese one, that either they may prove to be conspecific, or might be so regarded by a botanist who took wider views of the possible variation of species than now prevail; or else they indicate species which, however distinct in their special character, are manifestly counterpart or strictly representative species, the one of the other; as, for instance, our Texan *Sophora affinis* of *S. Japonica*, our *Wistaria* of the Japanese species, and *Arethusa Japonica* of our *A. bulbosa*. In a few cases plants of different genera are italicized, to note a case of remarkable representation; as our *Schizandra* in the Atlantic United States, representing both *Kadsura* and an oligandrous *Sphærostema* in Japan; or *Aplectrum*, here the evident analogue of *Oreorchis* on the other side of the hemisphere. The names in ordinary type indicate species of less intimate, but still of near relationship, — how near, it is difficult to express in words; but general botanists will readily perceive what is intended, upon looking over the table.

Authorities for the species are wholly omitted, to save room upon the page.

* * * Under the *Nymphæaceæ*, on p. 381, the well-known case was inadvertently omitted of our *Brasenia peltata*, inhabiting the Atlantic side of North America, from Canada to Texas; also occurring in Japan (Planchon has identified it as Thunberg's *Menyanthes nymphoides*), in the Eastern Himalayas, and in Eastern Australia.

TABULAR VIEW OF THE DISTRIBUTION OF JAPANESE PLANTS AND THEIR
NEAREST ALLIES IN THE NORTHERN TEMPERATE ZONE.

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
<i>Clematis Viticella</i>		<i>Clematis florida</i> & <i>patens</i>		
	<i>C. Nepalensis</i> & <i>montana</i>	<i>Clematis Williamsii</i> & <i>Japonica</i>		
	<i>C. grata</i>	<i>Clematis apiifolia</i> , <i>bitermata</i> , &c.	<i>C. ligusticifolia</i>	<i>C. Virginiana</i> .
<i>T. Kemense</i>	<i>T. Kemense</i>	<i>Thalictrum Thunbergii</i>		
<i>T. simplex</i>	<i>T. affine</i>	<i>Thalictrum affine</i>		
<i>P. pratensis</i>	<i>P. pratensis</i>	<i>Pulsatilla cernua</i>		<i>P. Nuttalliana</i>
	<i>A. umbrosa</i>	<i>Anemone umbrosa</i>		
	<i>A. Altaica</i>	<i>Anemone Altaica</i>		
	<i>A. Baikalensis</i>	<i>Anemone Baikalensis</i>		
<i>A. narcissiflora</i>	<i>A. narcissiflora</i>	(<i>Anemone narcissiflora</i>)	<i>A. narcissiflora</i>	
	<i>A. Pennsylvanica</i>	(<i>Anemone Pennsylvanica</i>)	<i>A. Pennsylvanica</i>	<i>A. Pennsylvanica</i>
<i>H. triloba</i>	<i>H. triloba</i>	(<i>Hepatica triloba</i>)	<i>H. triloba</i>	<i>H. triloba</i> & <i>acutiloba</i>
		(<i>Trautvetteria Japonica</i> , S. & Z.)	<i>T. palmata</i>	<i>T. palmata</i>
<i>A. Apennina</i>	<i>A. Apennina</i> , <i>Sibirica</i>	(<i>Adonis Apennina</i> , var. <i>Sibirica</i>)		
<i>R. repens</i>	<i>R. repens</i>	<i>Ranunculus repens</i> , var.	<i>R. repens</i> , vars.	<i>R. repens</i> , vars.
<i>R. sceleratus</i>	<i>R. sceleratus</i>	<i>Ranunculus sceleratus</i>	<i>R. sceleratus</i>	<i>R. sceleratus</i> (scarce)
<i>R. acris</i>	<i>R. propinquus</i>	<i>Ranunculus propinquus</i>		
<i>Caltha palustris</i>	<i>Caltha palustris</i>	<i>Caltha palustris</i>	<i>Caltha palustris</i>	<i>Caltha palustris</i>
<i>T. Europæus</i>	<i>T. patulus</i>	<i>Trollius patulus</i> ?		<i>T. Americanus</i>
<i>C. trifolia</i>	<i>C. trifolia</i>	<i>Coptis trifolia</i>	<i>C. trifolia</i>	<i>C. trifolia</i>
	(<i>C. Teeta</i>)	(<i>Coptis brachypetala</i> , S. & Z.)	<i>C. asplenifolia</i>	
		(<i>Coptis anemoneifolia</i> , S. & Z.)	<i>C. occidentalis</i>	
<i>I. thalictroides</i>		<i>Isopyrum adoxoides</i>	<i>I. occidentale</i>	<i>I. bitermatum</i>
<i>A. vulgaris</i>	<i>A. vulgaris</i> & vars.	(<i>Aquilegia Burgeriana</i>)	<i>A. Canadensis</i>	<i>A. Canadensis</i>
<i>A. Lycoctonum</i>	<i>A. Lycoctonum</i>	(<i>Aconitum Japonicum</i>)		<i>A. reclinatum</i>
<i>A. spicata</i>	<i>A. spicata</i> , ♂ vars.	<i>Actæa spicata</i>	<i>A. spicata</i> , v. <i>rubra</i>	<i>A. spicata</i> , v. <i>alba</i> & <i>rubra</i>
<i>C. fetida</i> [E. Eu.]	<i>C. fetida</i>	(<i>Cimicifuga fetida</i> ?)	<i>C. fetida</i>	<i>C. Americana</i>
		<i>Pityrospasma acerinum</i> , <i>obtusilobum</i> , [& <i>bitermatum</i>]		<i>Cimicifuga</i> (<i>Macrotys</i>) [<i>cordifolia</i> & <i>racemosa</i>]
		<i>Glaucidium palmatum</i>		<i>Hydrastis Canadensis</i>
<i>P. officinalis</i>	<i>P. officinalis</i>	<i>Pæonia officinalis</i>	<i>P. Rossii</i>	
	<i>I. Griffithii</i>	<i>Illicium religiosum</i>		<i>I. Floridum</i> & <i>parvifl.</i>
	<i>Magnolia</i> & <i>Michelia</i> spp.	<i>Magnolia</i> & <i>Burgeria</i> spp.		<i>Magnolia</i> spp.
	<i>K. Roxburghiana</i>	<i>Kadsura Japonica</i>		
	<i>Sphaerostema</i> spp.	<i>Sphaerostema Japonicum</i>		<i>Schizandra coccinea</i>
	<i>Parvattia</i> & <i>Hollobolia</i>	<i>Akebia</i> & <i>Stauntonia</i> spp. [<i>Lardizabala</i> spp. in Chili.]		
	<i>Cocculus</i> spp. & <i>Meni-</i> [<i>spermum</i> ?]	<i>Cocculus Thunbergii</i> , &c.		<i>Cocculus</i> & <i>Menispermum</i>
<i>B. vulgaris</i>	<i>B. vulgaris</i>	<i>Berberis vulgaris</i>		
<i>B. vulgaris</i> , <i>Cretica</i>	<i>B. vulgaris</i> , <i>Cretica</i>	<i>Berberis Thunbergii</i>		<i>B. Canadensis</i>

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
	<i>B. Nepalensis</i>	(<i>Berberis</i> (<i>Mahonia</i>) <i>Japonica</i>) <i>Caulophyllum thalictroides</i> ! <i>Diphylleia cymosa</i> !	<i>B. Aquifolium</i>	<i>B. trifoliolata</i> <i>C. thalictroides</i> <i>D. cymosa</i>
<i>E. alpinum</i>	<i>Epimedium</i> spp. aff.	<i>Epimedium</i> & <i>Aceranthus</i> spp.	<i>Vancouveria</i>	
<i>N. lutea</i>	<i>N. lutea</i>	<i>Nuphar Japonica</i>	<i>N. lutea</i> & <i>advena</i>	<i>N. sagittæfolia</i> , <i>lutea</i> , &c.
<i>N. alba</i>	<i>N. alba</i>	(<i>Nymphaea alba</i> ?)		<i>N. odorata</i>
	<i>D. lachenalii</i> folia	<i>Dicentra spectabilis</i> & } <i>Dicentra pusilla</i>	<i>D. formosa</i> & <i>Cucullaria</i> }	<i>D. formosa</i> , <i>Cuculla-</i> [<i>ria</i> & <i>Canadensis</i>
	<i>C. ambigua</i>	<i>Corydalis ambigua</i>		
<i>Corydalis</i> spp. aff.	<i>Corydalis</i> spp. aff.	<i>Corydalis</i> , 6 spp.	<i>C. aurea</i> & <i>glauca</i>	<i>C. aurea</i> & <i>glauca</i>
<i>N. officinale</i>	<i>N. officinale</i>	<i>Nasturtium officinale</i>		
<i>N. palustre</i>	<i>N. palustre</i>	<i>Nasturtium palustre</i>	<i>N. palustre</i>	<i>N. palustre</i> , vars.
<i>T. glabra</i>	<i>T. glabra</i>	<i>Turritis glabra</i>	<i>T. glabra</i>	<i>T. glabra</i> (scarce)
<i>A. hirsuta</i>	<i>A. hirsuta</i>	<i>Arabis hirsuta</i>	<i>A. hirsuta</i>	<i>A. hirsuta</i> , vars.
<i>A. alpina</i>	<i>A. alpina</i>	<i>Arabis Japonica</i>		
<i>A. petraea</i>	<i>A. petraea</i>	<i>Arabis lyrata</i>	<i>A. lyrata</i> , <i>ambigua</i>	<i>A. lyrata</i>
<i>C. Impatiens</i>	<i>C. Impatiens</i>	<i>Cardamine Impatiens</i>		
<i>C. parviflora</i>	<i>C. parviflora</i>	<i>Cardamine parviflora</i>		
	<i>C. macrophylla</i>	<i>Cardamine macrophylla</i>		
<i>D. nemorosa</i>	<i>D. nemorosa</i>	<i>Draba nemorosa</i>	<i>D. nemorosa</i>	<i>D. nemorosa</i> (scarce)
<i>V. Selkirkii</i> (umbrosa)	<i>V. Selkirkii</i> , <i>imberbis</i> , Led.	<i>Viola Selkirkii</i>		<i>V. Selkirkii</i>
	<i>V. Patrinii</i>	<i>Viola Patrinii</i>		<i>V. primulæfolia</i>
		<i>Viola grypceras</i>	<i>V. adunca</i> ?	<i>V. rostrata</i> ?
<i>V. sylvatica</i>	<i>V. sylvatica</i>	<i>Viola sylvatica</i> (canina, Sm.)	<i>V. adunca</i>	<i>V. Muhlenbergii</i>
		<i>Viola laciniosa</i>		<i>V. striata</i>
<i>V. biflora</i>	<i>V. biflora</i>	<i>Viola verecunda</i> , n. sp.	<i>V. Canad.</i> & <i>ocellata</i>	<i>V. Canadensis</i>
<i>D. rotundifolia</i>	<i>D. rotundifolia</i>	<i>Drosera rotundifolia</i>	<i>D. rotundifolia</i>	<i>D. rotundifolia</i>
<i>P. palustris</i>	<i>P. palustris</i> , &c.	(<i>Parnassia mucronata</i> , S. & Z.)	<i>P. palustris</i> & <i>parvifl.</i>	<i>P. palustris</i> & <i>Carolin.</i>
<i>D. superbus</i>	<i>D. superbus</i>	<i>Dianthus superbus</i>		
<i>Lychnis</i> spp.	<i>L. fulgens</i>	<i>Lychnis Senno</i>		
<i>H. peploides</i>	<i>H. peploides</i>	<i>Honkenya peploides</i> , v. <i>oblongifolia</i>	<i>H. peploides</i> , <i>oblongif.</i>	<i>H. peploides</i>
<i>M. lateriflora</i>	<i>M. lateriflora</i>	<i>Mehringia lateriflora</i>	<i>M. lateriflora</i>	<i>M. lateriflora</i>
<i>S. uliginosa</i> & <i>borealis</i>	<i>S. uliginosa</i> & <i>borealis</i>	<i>Stellaria uliginosa</i> , var. <i>undulata</i>	<i>S. uliginosa</i> & <i>crispa</i>	<i>S. uliginosa</i> & <i>borealis</i>
<i>M. aquaticum</i>	<i>M. aquaticum</i>	<i>Malachium aquaticum</i>		
<i>C. vulgatum</i> & <i>visc.</i>	<i>C. vulgatum</i> & <i>viscosum</i>	<i>Cerastium vulgatum</i> & <i>viscosum</i>	<i>C. vulgatum</i> & <i>viscosum</i>	<i>C. vulgatum</i> & <i>viscosum</i>
<i>Tilia</i> spp.	<i>Tilia</i> spp.	(<i>Tilia</i> 2 spp. ex S. & Z.)		<i>Tilia</i> spp.
	<i>Eurya</i> spp. aff.	<i>Eurya Japonica</i>		
	<i>C. Wallichiana</i>	<i>Cleyera Japonica</i>		
	<i>C. Kissi</i> , &c.	<i>Camellia Japonica</i> & <i>Sesamqua</i>		
	<i>T. Assamica</i>	<i>Thea Chinensis</i>		
		<i>Stuartia monadelphæ</i>		<i>S. Virginica</i> , & pen- [tagyna
	<i>Actinidia callosa</i>	<i>Actinidia callosa</i> & spp.		
<i>O. corniculata</i>	<i>O. corniculata</i>	<i>Oxalis corniculata</i>	<i>O. corniculata</i>	<i>O. corniculata</i>
<i>O. Acetosella</i>	<i>O. Acetosella</i>	(<i>Oxalis Acetosella</i> ex Thunb.)	<i>O. Oregana</i> & <i>trilliif.</i>	<i>O. Acetosella</i> , Amer.
	<i>G. eriostemon</i>	<i>Geranium erianthum</i>	<i>G. erianthum</i>	
<i>G. palustre</i>	<i>G. palustre</i> ?	(<i>Geranium Thunbergii</i>)		
	<i>Zanthoxylum</i> spp.	<i>Zanthoxylum</i> 4 spp.		<i>Z. Amer.</i> & <i>Carol.</i>
	<i>S. Laureola</i>	<i>Skinimia Japonica</i>		
	<i>P. Nepalensis</i>	<i>Picrasma Japonica</i> , n. sp.		

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
	<i>B. albiflora</i>	<i>Bœninghausenia albiflora</i>		
<i>C. myrtifolia</i>	<i>C. Nepalensis</i>	<i>Coriaria Japonica</i> , n. sp.	[<i>C. ? atropurpurea</i> , Mex.]	
		<i>Rhus Toxicodendron</i>	<i>R. Toxic. diversiloba</i>	<i>R. Toxicodendron</i>
	<i>R. vernicifera</i>	<i>Rhus vernicifera</i>		<i>R. venenata</i>
<i>R. Coriaria</i>	<i>R. semialata</i>	<i>Rhus semialata</i>		<i>R. Copallina</i>
	<i>V. Indica</i>	<i>Vitis Labrusca</i> (<i>Thunbergii</i>)		<i>V. Labrusca</i>
	<i>Cissus</i> spp.	<i>Cissus</i> spp.		<i>Cissus</i> spp.
		(<i>Ampelopsis</i> spp. ex S. & Z.)		<i>Ampelopsis Virgin.</i>
<i>R. catharticus</i>	<i>R. Davuricus & virgatus</i>	<i>Rhamnus catharticus</i> (<i>globosus</i>)		
<i>F. rupestris</i>		<i>Frangula</i> (<i>Rh. crenatus</i> , S. & Z.)	<i>F. Californica</i>	<i>F. Caroliniana</i>
	<i>Berchemia</i> sp.	<i>Berchemia</i> (<i>lineata</i> &) <i>racemosa</i>		<i>B. volubilis</i>
	<i>H. inæqualis</i>	<i>Hovenia dulcis</i>		
<i>Ilex</i> sp.		<i>Ilex</i> spp. plur.		<i>Ilex & Prinos</i>
	<i>E. lucidus</i> , &c.	<i>Evonymus Japonicus</i>		
<i>E. Europæus</i>		<i>Evonymus Sieboldianus</i>		<i>E. Americanus</i>
	<i>E. Hamiltonianus</i>	<i>Evonymus Hamiltonianus</i>	<i>E. occidentalis</i>	<i>E. atropurpureus</i>
<i>E. latifolius</i>		<i>Evonymus latifolius</i>		
		<i>Celastrus articulatus, punctulatus</i> , &c.		<i>C. scandens</i>
<i>S. pinnata</i>		<i>Staphylea Bumalda</i>		<i>S. trifolia</i>
	<i>Æ. Hippocastanum</i>	<i>Æsculus turbinata</i> & <i>dissimilis</i>	<i>Æ. Californica</i>	<i>Æsculus & § Pavia</i>
	<i>Sapindus</i> spp.	(<i>Sapindus Mukurossi</i>)		<i>S. marginatus</i>
		<i>Acer</i> 10 spp., mostly of Himalayan or peculiar types : —		
		<i>A. Japonicum</i> , the counterpart of	<i>A. circinatum</i>	
<i>A. platanoides</i>		<i>A. pictum</i> , of		<i>A. saccharinum</i>
		(<i>Negundo cissifolium</i> , S. & Z.)	<i>N. aceroides</i>	<i>N. aceroides</i>
		<i>Thermopsis fabacea</i>	<i>T. fabacea</i> &	<i>T. Caroliniana, fraxini-</i>
			<i>T. macrophylla</i>	[<i>folia</i> , & <i>mollis</i>
			<i>Hosackia</i> spp.	<i>Hosackia</i> sp.
<i>L. corniculatus</i>	<i>L. corniculatus</i>	<i>Lotus corniculatus</i>		
	<i>O. lathyroides</i>	<i>Orobis lathyroides</i>		
<i>L. palustris</i>	<i>L. palustris</i>	<i>Lathyrus palustris</i>	<i>L. palustris</i>	<i>L. palustris</i>
<i>Vicia</i> spp.	<i>V. pallida</i>	<i>Vicia Japonica</i> , n. sp.	<i>V. Americana</i> , var.	<i>V. Americana</i>
	<i>Desmodium</i> spp.	(<i>Desmodium racemosum</i>)		<i>Desmodium</i> spp.
	<i>Lespedeza</i> spp. aff.	<i>Lespedeza</i> , 4 spp.		<i>Lespedeza</i> spp.
	<i>Dumasia villosa</i> , &c.	(<i>Dumasia truncata</i> , S. & Z.)		
	<i>Rhynchosia</i> spp.	<i>Rhynchosia volubilis</i>		<i>Rhynchosia</i> spp.
		<i>Wistaria Sinensis & brachybotrys</i>		<i>W. frutescens</i>
	<i>Millettia</i> spp.	<i>Millettia Japonica</i>		
	<i>S. flavescens & alopec.</i>	(<i>Sophora angustifolia</i> , S. & Z.)		<i>S. sericea</i>
		<i>Sophora Japonica</i>		<i>S. affinis</i>
	<i>P. Armeniaca & Sibirica</i>	<i>Prunus (Armeniaca) Mume</i>		
<i>P. Cerasus</i>	<i>P. Puddum</i>	<i>Prunus Pseudo-Cerasus</i>		
	<i>P. tomentosa</i>	<i>Prunus tomentosa</i>		<i>P. gracilis & maritima</i>
<i>P. Padus</i>	<i>P. Padus</i>	<i>Prunus Virginiana</i> ?	<i>P. demissa</i>	<i>P. Virginiana</i>
<i>P. Lauro-Cerasus</i>	<i>P. acuminata</i>	<i>Prunus spinulosa</i>		<i>P. Caroliniana</i>
	<i>S. callosa</i>	<i>Spiræa callosa</i>		
<i>S. hypericif. & crenata</i>	<i>S. hypericif. & crenata</i>	<i>Spiræa Thunbergii</i>		
<i>S. chamædrifolia</i>	<i>S. chamædrifolia</i>	<i>Spiræa chamædrifolia</i>		
		<i>Spiræa betulæfolia</i>	<i>S. betulæfolia</i>	<i>S. betulæfol. (corymbosa)</i>

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
<i>S. salicifolia</i> [E.]	<i>S. salicifolia</i>	<i>Spiræa salicifolia</i>	<i>S. Menziesii</i>	<i>S. salicifolia</i> , var.
<i>S. Ulmaria</i>	<i>S. Kamtschatica</i>	<i>Spiræa palmata</i>		<i>S. lobata</i>
<i>S. Aruncus</i> [E.]	<i>S. Aruncus</i>	<i>Spiræa Aruncus</i>	<i>Spiræa Aruncus</i>	<i>S. Aruncus</i>
	<i>Neillia</i> , spp.	<i>Stephanandra</i> , <i>Kerria</i> , & <i>Rhodotypos</i>		<i>Nevia</i> Alabam., n. g.
<i>S. Europæa</i>	<i>S. alpina</i>	<i>Sanguisorba tenuifolia</i>	<i>S. Canadensis</i>	<i>S. Canadensis</i>
<i>A. Eupatoria</i> & <i>pilosa</i>	<i>A. Eupatoria</i> , &c.	<i>Agrimonia Eupatoria</i> , <i>viscidula</i>		<i>A. Eupatoria</i> , &c.
<i>G. strictum</i> [E.]	<i>G. strictum</i>	<i>Geum strictum</i>	<i>G. strictum</i> ?	<i>G. strictum</i>
<i>P. palustris</i>	<i>P. palustris</i>	<i>Potentilla palustris</i>	<i>P. palustris</i>	<i>P. palustris</i>
<i>P. Anserina</i>	<i>P. Anserina</i>	<i>Potentilla Anserina</i>	<i>P. Anserina</i>	<i>P. Anserina</i>
	<i>P. fragarioides</i>	<i>Potentilla fragarioides</i>		
		<i>Potentilla fragiformis</i>	<i>P. fragiformis</i>	
<i>P. reptans</i>	<i>P. reptans</i>	<i>Potentilla reptans</i> & var.		
	<i>F. Indica</i>	<i>Fragaria Indica</i>		
<i>R. Chamæmorus</i>	<i>R. Chamæmorus</i>	<i>Rubus Chamæmorus</i>	<i>R. Chamæmorus</i>	<i>R. Chamæmorus</i>
	<i>R. rosæfolius</i> , <i>parvifol.</i>	<i>Rubus rosæfolius</i> , <i>parvifolius</i>		
<i>R. alpina</i>	<i>R. acicularis</i>	<i>Rosa acicularis</i>	<i>R. fraxinifolia</i>	<i>R. stricta</i> ?
	<i>E. elliptica</i>	<i>Eriobotrya Japonica</i>		
	<i>P. sp. ined.</i> , Hook.	<i>Photinia villosa</i> & <i>lævis</i>		
		<i>Photinia serrulata</i> (and in Bonin		
	<i>P. integrifolia</i>	<i>Photinia arbutifolia</i>)	<i>P. arbutifolia</i>	
		[<i>Osteomeles anthyllidifolia</i> , Loo Choo, Bonin, & Sandwich Islands.]		
		<i>Cratægus alnifolia</i>	<i>C. rivularis</i>	<i>C. Crus-galli</i> , <i>prunif.</i>
<i>A. vulgaris</i>	<i>A. vulgaris</i> , &c.	<i>Amelanchier Asiatica</i>	<i>A. Canadensis</i> , vars.	<i>A. Canadensis</i>
<i>P. torminalis</i>	<i>P. torminalis</i>	<i>Pyrus rivularis</i> ?	<i>P. rivularis</i>	
<i>P. Malus</i>	<i>P. Malus</i> ?	<i>Pyrus spectabilis</i>		<i>P. coronaria</i>
<i>P. aucuparia</i>	<i>P. ursina</i>	<i>P. (Sorbus) gracilis</i>	<i>P. sambucifolia</i> , var.	<i>P. Americana</i> .
		<i>Chimonanthus fragrans</i>	<i>Calycanthus occid.</i>	<i>Calycanthus</i> 3 spp.
<i>C. alpina</i>	<i>C. alpina</i>	<i>Circæa alpina</i>	<i>C. alpina</i>	<i>C. alpina</i>
<i>C. Lutetiana</i>	<i>C. Lutetiana</i>	(<i>Circæa mollis</i> , S. & Z.)		<i>C. Lutetiana</i>
	<i>A. barbata</i> & <i>rubra</i>	<i>Astilbe Japonica</i> & <i>Thunbergii</i> , &		<i>A. decandra</i>
		<i>Rodgersia podophylla</i> , n. g.		
		(<i>Mitella</i> , <i>Mitellopsis</i> , <i>Japonica</i> , S. & Z.)	<i>M. pentandra</i>	<i>M. diphylla</i>
<i>C. oppositifolium</i>	<i>C. Nepalense</i> & <i>trichosper.</i>	<i>Chrysosplenium Kamtschaticum</i>	<i>C. Nepalense</i> , <i>glechom.</i>	<i>C. Americanum</i>
	<i>C. ovalifolium</i>	<i>Chrysosplenium ovalifolium</i>		
	<i>Hydrangea</i> spp. aff.	<i>Hydrangea</i> spp. plur.		<i>Hydrangea</i> , 3 spp.
	<i>Piliostegia</i>	{ <i>Cardiandra</i> , <i>Schizophragma</i> , <i>Platycrater</i> , }		<i>Decumaria</i>
	<i>D. staminea</i> , <i>macrantha</i> ,	<i>Deutzia crenata</i> , <i>scabra</i> , & <i>gracilis</i>		<i>Fendlera</i> ?
	<i>P. coronarius</i> , var.	<i>Philadelphus coronarius</i> , &c.	<i>P. Lewisii</i>	<i>P. inodorus</i> , &c.
	<i>I. Chinensis</i>	[<i>Itea Chinensis</i> , Loo Choo]		<i>I. Virginica</i>
		[<i>Penthorum sedoides</i> , China]		<i>P. sedoides</i>
	<i>Sedum hybridum</i> , &c.	<i>Sedum hybridum</i> , &c.		
	<i>H. Chinensis</i> & <i>Parrotia</i>	<i>Hamamelis Japonica</i>		<i>H. Virginica</i>
	<i>C. Himalayana</i>	<i>Corylopsis spicata</i> & <i>pauciflora</i>		<i>Fothergilla alnifolia</i>
	<i>L. Altingia</i>	(<i>Liquidambar</i> spp.)		<i>L. styraciflua</i>
		(<i>Ribes Cynosbati</i> , ex Thunb.)		<i>R. Cynosbati</i>
		<i>Ribes laxiflorum</i>	<i>R. laxiflorum</i>	<i>R. prostratum</i>

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<i>R. nigrum</i>	<i>R. nigrum</i>	<i>Ribes nigrum</i> (Okotsk)	<i>R. Hudsonianum</i>	<i>R. Hudsonianum</i>
S. Europæa	<i>S. elata</i>	<i>Sanicula elata</i>	<i>Sanicula</i> spp.	S. Canadensis & Maril.
	<i>B. multinerve</i>	<i>Bupleurum multinerve</i>		<i>C. Canadensis</i>
<i>A. officinalis</i>		<i>Cryptotenia Canadensis</i>	<i>A. Gmelini</i> = <i>peregrina</i>	<i>A. Gmelini</i> = <i>peregrina</i>
		<i>Angelica Japonica</i>		<i>A. atropurpurea</i> ?
		<i>Cymopterus</i> ? <i>littoralis</i> , <i>glaber</i>	<i>C. ? littoralis</i>	
		<i>Heracleum lanatum</i>	<i>H. lanatum</i>	<i>H. lanatum</i>
		(<i>Archemora</i> sp. ex S. & Z.)		<i>Archemora rigida</i>
<i>A. sylvestris</i> & <i>nemor.</i>	<i>A. sylvestris</i> & <i>nemorosa</i>	<i>Anthriscus sylvestris</i>	<i>O. longistylis</i> & <i>brevist.</i>	<i>O. longistylis</i> & <i>brevist.</i>
		<i>Osmorrhiza longistylis</i>	<i>E. horridus</i>	
		<i>Echinopanax horridus</i>		
	<i>A. (Ginseng) quinquefolia</i>	<i>Aralia (Ginseng) quinquefolia</i>		<i>A. (Ginseng) quinquefolia</i>
		<i>Aralia edulis</i>		<i>A. racemosa</i>
<i>H. Helix</i>	<i>H. Helix</i>	<i>Hedera Helix</i>		
	<i>A. Himalaica</i>	<i>Ancuba Japonica</i>		
<i>C. Suecica</i>	<i>C. Suecica</i>	<i>Cornus Suecica</i>	<i>C. Suecica</i>	<i>C. Suecica</i>
		<i>Cornus Canadensis</i>	<i>C. Canadensis</i>	<i>C. Canadensis</i>
	<i>B. fragifera</i>	<i>Benthamia Japonica</i>	<i>Cornus Nuttallii</i>	<i>C. florida</i>
<i>C. sanguinea</i>	<i>C. sanguinea</i>	<i>Cornus sanguinea</i>	<i>C. Californica</i>	<i>C. sericea</i>
	<i>C. alba</i>	<i>Cornus alba</i>		<i>C. stolonifera</i>
<i>C. mas</i>		<i>Cornus officinalis</i>	<i>C. sessilis</i>	
	<i>A. triflora</i>	<i>Abelia serrata</i> & <i>spatulata</i>		
		<i>Diervilla</i> (Weigela) <i>Japonica</i> , & }		<i>D. trifida</i> & <i>sessilifolia</i>
		<i>Diervilla</i> (Weigela) <i>floribunda</i> }		
<i>L. borealis</i>	<i>L. borealis</i>	(<i>Linnaea borealis</i>)	<i>L. borealis</i>	<i>L. borealis</i>
	<i>L. Japonica</i>	<i>Lonicera Japonica</i>		
<i>L. Xylosteum</i>		<i>Lonicera Morrowi</i>		<i>L. oblongifolia</i>
<i>L. cœrulea</i>		(<i>Lonicera brachypoda</i>)		<i>L. cœrulea</i>
<i>V. Opulus</i>	<i>V. Opulus</i>	<i>Viburnum Opulus</i>	<i>V. Opulus</i> , var.	<i>V. Opulus</i>
	<i>V. cordifolium</i>	<i>Viburnum plicatum</i>		<i>V. plicatum</i> = <i>lantanoides</i>
<i>V. Lantana</i>		<i>Viburnum (tomentosum &) dilatatum</i>		<i>V. pubescens</i> , var.
		<i>Viburnum erosum</i>		<i>V. dentatum</i>
	<i>V. odoratissimum</i>	<i>Viburnum odoratissimum</i>		
<i>S. racemosa</i>	<i>S. racemosa</i>	<i>Sambucus racemosa</i> , var.	<i>S. racemosa</i> (<i>pubens</i>)	<i>S. racemosa</i> (<i>pubens</i>)
<i>S. Ebulus</i>	<i>S. Ebulus</i>	(<i>Sambucus ebuloides</i>)		
<i>A. odorata</i>	<i>A. odorata</i>	<i>Asperula odorata</i>		
<i>G. verum, lasiocarpum</i>	<i>G. verum, lasiocarpum</i>	<i>Galium verum, lasiocarpum</i>		
<i>G. triflorum</i>	<i>G. triflorum</i> ?	<i>Galium triflorum</i>	<i>G. triflorum</i>	<i>G. triflorum</i>
	<i>G. Hamiltoni</i>	<i>Galium trachyspermum</i>		
<i>G. Aparine</i> & var.	<i>G. Aparine</i> , var.	<i>Galium Aparine, Vaillantii</i>	<i>G. Aparine</i>	<i>G. Aparine</i>
	<i>R. cordifolia</i>	(<i>Rubia cordifolia</i>)		
	<i>P. fœtida</i>	<i>Pœderia fœtida</i>		
		(<i>Mitchella undulata</i> , S. & Z.)		<i>Mitchella repens</i>
<i>V. dioica</i>		<i>Valeriana dioica</i>	<i>V. dioica</i>	<i>V. dioica</i>
	<i>P. Sibirica</i> , &c.	<i>Patrinia parviflora</i>		
	<i>A. latifolium</i>	<i>Adenostoma glutinosum</i> ?		
	<i>E. Finlaysonianum</i>	<i>Eupatorium Finlaysonianum</i>		<i>E. album</i>

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		<i>Eupatorium Reevesii</i>		<i>E. pubescens</i>
<i>E. cannabinum</i>		(<i>Eupatorium Japonicum</i>)		
<i>P. albus</i>	<i>P. albus</i>	<i>Petasites albus</i>		
	<i>A. (Dollingeria) spp.</i>	<i>Aster Kämpferi</i>		
	<i>A. Tartaricus</i>	<i>Aster Tartaricus</i>		
<i>A. Tripolium</i>	<i>A. Tripolium</i>	(<i>Aster Tripolium</i>)	<i>A. occidentalis</i>	<i>A. flexuosus</i>
	<i>Calimeris incisa</i>	(<i>Calimeris incisa</i>)		
		<i>Erigeron Thunbergii</i>	<i>E. glaucum</i>	<i>E. glabellum</i>
<i>S. Virgaurea, vars.</i>	<i>S. Virgaurea, vars.</i>	<i>Solidago Virgaurea, leiocarpa</i>	<i>S. Virgaurea, multiradiata</i>	<i>S. Virgaurea, thyrsoides</i>
	<i>E. prostrata</i> & <i>erecta</i>	<i>Eclipta prostrata</i>		<i>E. erecta, procumbens</i>
	<i>S. orientalis</i>	<i>Siegesbeckia orientalis</i>	[<i>S. Jorullensis</i> in Mexico]	
	<i>A. Sibirica</i>	<i>Achillea Sibirica</i>	<i>A. Sibirica</i>	
<i>A. vulgaris</i>	<i>A. vulgaris</i>	<i>Artemisia vulgaris</i>	<i>A. Ludoviciana</i>	<i>A. Ludov. & vulgaris</i>
	<i>A. borealis</i>	<i>Artemisia borealis</i>	<i>A. borealis</i>	<i>A. borealis</i>
	<i>G. multiceps</i>	<i>Gnaphalium multiceps</i>		
		(<i>Gnaphalium polycephalum</i> , fide Hance)		<i>G. polycephalum</i>
<i>C. cernuum</i> & <i>abrotanoides</i>	<i>C. racemosum</i>	<i>Carpesium divaricatum</i> & <i>Thunbergianum</i>		
	<i>L. retusa</i> & <i>reniformis</i> ?	<i>Ligularia Kämpferi</i> & <i>gigantea</i>		
<i>C. hastata</i> [E. Eu.]	<i>C. hastata</i>	<i>Cacalia hastata</i>		<i>C. suaveolens</i>
		(<i>Cacalia farfaræfolia</i> & <i>delphinifolia</i>)		<i>C. atriplicifolia</i> , &c.
		<i>Senecio Pseudo-Arnica</i>	<i>S. Pseudo-Arnica</i>	<i>S. Pseudo Arnica</i>
	<i>S. palmatus</i>	<i>Senecio palmatus</i>		
	<i>Gynura</i> ? = <i>P. Cusimbua</i>	<i>Gynura pinnatifida</i> = <i>Porophyllum Jap.</i>		
	<i>A. multicaulis</i>	<i>Aplotaxis multicaulis</i>		
	<i>S. elongata</i> , &c.	<i>Saussurea Japonica</i>		
<i>C. acaule</i>		<i>Cirsium brevicaulis</i> , n. sp.		<i>C. pumilum</i> ?
<i>C. lappaceum</i>		<i>Cirsium pectinellum</i> , n. sp.		
		<i>Anandria Bellidiastrum</i>		<i>Chaptalia tomentosa</i>
<i>L. communis</i>	<i>L. communis</i>	<i>Lampsana parviflora</i> , n. sp.		
<i>P. hieracioides</i>	<i>P. hieracioides</i> (<i>Dahurica</i>)	<i>Picris hieracioides</i>		
<i>T. Dens-leonis</i>	<i>T. Dens-leonis</i>	<i>Taraxacum Dens-leonis</i>	<i>T. Dens-leonis</i>	<i>T. Dens-leonis</i>
	<i>Ixeris</i> 2 spp.	<i>Ixeris</i> 5 spp.		
	<i>Youngia Japonica</i> , &c.	<i>Youngia Japonica</i> , &c.		
	<i>I. Roxburghianus</i>	<i>Isolobus campanuloides</i> & <i>radicans</i>		
	<i>W. agrestis</i>	<i>Wahlenbergia marginata</i>		
	<i>A. verticillata</i>	<i>Adenophora verticillata</i>		
		(<i>Campanula remotiflora</i> , S. & Z.)	<i>C. Scouleri</i> ?	<i>C. divaricata</i> ?
<i>C. Trachelium</i>	<i>C. Trachelium</i>	<i>Campanula Trachelium</i>		
	<i>C. punctata</i>	<i>Campanula punctata</i>		
	<i>P. grandiflorum</i>	<i>Platycodon grandiflorum</i>		
	<i>C. lanceolata</i> & <i>Javanica</i>	<i>Campanumœa lanceolata</i>		
<i>V. Oxycoccus</i>	<i>V. Oxycoccus</i>	<i>Vaccinium macrocarpon</i>	<i>V. macroc. & Oxycoc.</i>	<i>V. macroc. & Oxycoc.</i>
<i>V. Vitis-Idæa</i>	<i>V. Vitis-Idæa</i>	<i>Vaccinium Vitis-Idæa</i>	<i>V. Vitis-Idæa</i>	<i>V. Vitis-Idæa</i>
		<i>Vaccinium Smallii</i> , n. sp.	<i>V. myrtilloides</i>	<i>V. § Cyanococcus</i>
	<i>V. bracteatum</i>	<i>Vaccinium bracteatum</i>		
	<i>V. Dunalianum</i>	<i>Vaccinium Wrightii</i> , n. sp. (<i>Ousima</i>)		
<i>E. nigrum</i>	<i>E. nigrum</i>	<i>Empetrum nigrum</i>	<i>E. nigrum</i>	<i>E. nigrum</i>

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
	<i>Gaultheria</i> , spp.	(<i>Gaultheria triquetra</i> , S. & Z.) <i>Leucothoe chlorantha</i>	<i>G. Shallon</i>	<i>G. procumbens</i> <i>Leucothoe</i> spp.
	<i>A. (P.) ovalifolia</i>	<i>Andromeda (Pieris) elliptica</i> (<i>Andromeda (Pieris) Japonica</i>)		<i>A. (P.) phillyræfolia</i> <i>C. acuminata</i>
	<i>Clethra</i> spp.	<i>Clethra barbanervis</i> <i>Menziesia ferruginea, globularis</i>	<i>M. ferruginea</i>	<i>M. ferruginea, globularis</i>
<i>L. palustre</i> & var. <i>dilat.</i>	<i>L. palustre</i> & var. <i>dilat.</i>	<i>Ledum palustre</i> & var. <i>dilatatum</i>	<i>L. palustre</i> & <i>latifol.</i>	<i>L. palustre</i> & <i>latifolium</i>
<i>A. Pontica</i>		<i>Azalea Japonica</i> sp. nov.	<i>A. occidentalis</i>	<i>A. calendulacea</i>
	<i>R. campanulatum</i> , &c.	<i>Rhododendron brachycarpum</i>		<i>R. Catawbiense</i>
<i>R. Ponticum</i>	<i>R. spp. plur.</i>	<i>Rhododendron Metternichii</i>	<i>R. macrophyll.</i> & Calif.	<i>R. maximum</i>
<i>P. rotundifolia</i>	<i>P. rotundifolia, incarnata</i>	<i>Pyrola rotundifolia, incarnata</i>	<i>P. rotundifolia, incarnata</i>	<i>P. rotundifolia, incar-</i> [<i>nata, & uliginosa</i>
<i>P. media</i>		<i>Pyrola media</i>		
<i>P. minor</i>	<i>P. minor</i>	<i>Pyrola minor</i>	<i>P. minor</i>	<i>P. minor</i>
<i>M. uniflora</i>	<i>M. uniflora</i>	<i>Moneses uniflora</i>	<i>M. uniflora</i>	<i>M. uniflora</i>
<i>D. Lapponica</i>	<i>D. Lapponica</i>	<i>Diapensia Lapponica</i>	<i>D. Lapponica</i>	<i>D. Lapponica</i>
<i>S. officinale</i>	<i>S. Finlaysonianum</i> ?	<i>Styrax Obassia</i> <i>Styrax Japonica</i> <i>Pterostyrax</i> 3 spp.	<i>S. Californica</i>	<i>S. platanifol. & grandif.</i> <i>Halesia tetraptera</i> <i>S. tinctoria</i> <i>D. Virginiana</i>
	<i>Symplocos</i> spp.	<i>Symplocos Japonica</i>		
<i>D. Lotus [Eu.]</i>	<i>Diospyros</i> spp.	<i>Diospyros Kaki & Japonica</i>		
	<i>A. odontophylla</i> & spp.	<i>Ardisia Japonica</i> & spp.		
	<i>M. capitellata</i> & <i>parvifolia</i>	<i>Myrsine nerifolia</i>		<i>M. Floridana</i>
	<i>M. montana</i>	<i>Mæsa Dorena</i>		
	<i>P. cortusoides</i>	<i>Primula cortusoides</i>		
	<i>P. prolifera</i>	<i>Primula Japonica</i> , n. sp.		
<i>L. Ephemerum</i> , &c.	<i>L. lobelioides</i> , &c.	<i>Lysimachia clethroides</i> & <i>lubinioides</i> [L. aff., Sandwich Islands.]		
<i>L. nemorum</i>	<i>L. debilis</i>	<i>Lysimachia Japonica</i>		
<i>N. thyrsiflora</i>	<i>N. thyrsiflora</i>	<i>Naumburgia thyrsiflora</i>	<i>N. thyrsiflora</i>	<i>N. thyrsiflora</i>
<i>P. media & major</i>	<i>P. media & major</i>	<i>Plantago media</i> & <i>major</i>		
<i>U. intermedia</i>	<i>U. intermedia</i>	<i>Utricularia intermedia</i>		<i>U. intermedia</i>
	<i>B. glabra</i>	(<i>Boschniakia ex Zucc.</i>)	<i>B. glabra</i> , & spp.	
	<i>Æ. Indica</i>	<i>Æginetia Japonica</i> <i>Catalpa Kæmpferi</i> <i>Tecoma grandiflora</i>		<i>Catalpa bignonioides</i> <i>T. radicans</i>
<i>S. aquatica</i>	<i>S. aquatica</i>	<i>Scrophularia alata</i> , n. sp.		
<i>V. Anagallis</i>	<i>V. Anagallis</i>	<i>Veronica Anagallis</i>	<i>V. Anagallis</i> ?	<i>V. Anagallis</i>
<i>V. Chamædrys</i>	<i>V. laxa</i>	<i>Veronica Thunbergii</i> , n. sp.		
<i>V. paniculata</i>	<i>V. paniculata</i>	(<i>Veronica paniculata</i>)		
<i>V. longifolia</i>	<i>V. longifolia</i>	<i>Veronica longifolia</i> , var.		
	<i>V. Sibirica</i>	(<i>Veronica (Leptandra) Japonica</i>)		<i>V. Virginica</i>
<i>Pæderota</i> spp.		<i>Pæderota axillaris & bracteata</i>		
<i>P. resupinata</i> [E. Eu.]	<i>P. resupinata</i>	<i>Pedicularis resupinata</i>		<i>P. lanceolata</i>
	<i>Callicarpa</i> spp.	<i>Callicarpa</i> spp. plur.		<i>C. Americana</i>
		[<i>Polycælium bontioides</i> is represented in Sandwich Islands by <i>P. Sandwicense</i> .]		
	<i>T. Wallichianum</i>	(<i>Teucrium Japonicum</i>)		<i>T. Canadense</i>
<i>A. Genevensis</i>	<i>A. Genevensis</i>	<i>Ajuga ciliata</i>		
	<i>A. remota</i>	<i>Ajuga decumbens</i>		
<i>T. Serpyllum</i>	<i>T. Serpyllum</i>	<i>Thymus Serpyllum</i>		

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
	<i>C. umbrosa</i> & <i>debilis</i>	<i>Calamintha gracilis</i>		
<i>C. Clinopodium</i>	<i>C. Clinopodium</i>	<i>Calamintha Chinensis</i>		
	<i>S. plebeia</i>	<i>Salvia plebeia</i> , &c.		
<i>N. Glechoma</i>	<i>N. Glechoma</i>	<i>Nepeta Glechoma</i> & <i>var. grandis</i> (<i>Cedronella Japonica</i> , Hassk.)		<i>Cedronella cordata</i>
<i>D. Ruyschiana</i>	<i>D. Ruyschiana</i>	<i>Dracocephalum Ruyschiana</i> , <i>var. Jap.</i>		
<i>B. vulgaris</i>	<i>B. vulgaris</i>	<i>Brunella vulgaris</i>	<i>B. vulgaris</i>	<i>B. vulgaris</i>
	<i>S. violacea</i> , &c.	<i>Scutellaria Indica</i>		
		<i>Scutellaria Japonica</i>		<i>S. saxatilis</i>
<i>S. minor</i>	<i>S. minor</i>	<i>Scutellaria hederacea</i>		<i>S. nervosa</i>
<i>S. palustris</i>	<i>S. palustris</i> , <i>vars.</i>	<i>Stachys palustris</i> , <i>aspera</i>	<i>S. palustris</i> , <i>vars.</i>	<i>S. palustris</i> , <i>aspera</i>
<i>L. album</i>	<i>L. petiolatum</i>	<i>Lamium petiolatum</i>		
<i>L. officinale</i>	<i>L. officinale</i>	<i>Lithospermum officinale</i>		<i>L. latifolium</i>
<i>M. maritima</i>	<i>M. maritima</i>	<i>Mertensia maritima</i>	<i>M. maritima</i>	<i>M. maritima</i>
<i>M. arvensis</i>	<i>M. arvensis</i>	<i>Myosotis arvensis</i>		<i>M. arvensis</i> ?
	<i>E. pedunculare</i>	<i>Eritrichium pedunculare</i>		
	<i>B. tenellum</i>	<i>Bothrospermum asperugoides</i>		
<i>Omphalodes verna</i> !		<i>Eritrichium Guilielmi</i> , n. sp.		
		<i>Heliotropium Japonicum</i>		<i>H. convolvulaceum</i>
<i>S. nigrum</i>	<i>S. nigrum</i>	<i>Solanum nigrum</i>	<i>S. nigrum</i>	<i>S. nigrum</i>
	<i>P. Alkekengi</i> ?	<i>Physalis Alkekengi</i>		<i>P. angulata</i>
<i>L. vulgare</i>		<i>Lycium vulgare</i>		<i>L. Carolinianum</i>
<i>C. Soldanella</i>	<i>C. Soldanella</i>	<i>Calystegia Soldanella</i>	<i>C. Soldanella</i>	<i>C. Soldanella</i>
<i>P. cœruleum</i>	<i>P. cœruleum</i>	<i>Polemonium cœruleum</i>	<i>P. cœruleum</i> & <i>pulch.</i>	<i>P. reptans</i>
<i>P. Carinthiaca</i>	<i>P. rotata</i>	<i>Pleurogyne rotata</i>	<i>P. rotata</i>	<i>P. rotata</i>
	<i>O. paniculata</i>	<i>Ophelia bimaculata</i>		
	<i>C. speciosa</i> & <i>fasciculata</i>	<i>Crawfordia Japonica</i>		
	<i>G. aquatica</i>	<i>Gentiana Thunbergii</i>		
<i>G. prostrata</i>	<i>G. squarrosa</i>	<i>Gentiana squarrosa</i>	<i>G. prostrata</i>	
<i>M. trifoliata</i>	<i>M. trifoliata</i>	<i>Menyanthes trifoliata</i>	<i>M. trifoliata</i>	<i>M. trifoliata</i>
		<i>Amsonia elliptica</i>		<i>A. Tabernæmontana</i>
<i>Vincetoxicum</i> spp.	<i>Vincetoxicum</i> spp.	<i>Vincetoxicum</i> 6 spp.		
<i>O. Europæa</i>	<i>Olea</i> spp.	<i>Olea Aquifolium</i>		<i>O. Americana</i>
<i>L. vulgare</i>	<i>L. Nepalense</i>	<i>Ligustrum</i> 3 spp.		
<i>F. Ornus</i>		<i>Fraxinus Sieboldiana</i>	<i>F. dipetala</i>	
	<i>F. floribunda</i>	<i>Fraxinus longicuspis</i>		
<i>F. excelsior</i>	<i>Fraxinus</i> spp.	<i>Fraxinus pubinervis</i>		
<i>A. Europæum</i>	<i>A. Himalaicum</i>	(<i>Asarum Canadense</i> , ex Thunb.)	<i>A. Hookeri</i>	<i>A. Canadense</i>
		(<i>Asarum Virginicum</i> , Thunb. = <i>Heterotropa</i>)		<i>A. Virg. & arifolium</i>
		<i>Aristolochia Kämpferi</i>		<i>A. tomentosa</i>
<i>A. longa</i>		<i>Aristolochia debilis</i>		
	<i>P. acinosa</i>	<i>Phytolacca Kämpferi</i> , n. sp.		<i>P. decandra</i>
<i>C. maritima</i>	<i>C. maritima</i>	<i>Chenopodia maritima</i>	<i>C. maritima</i>	<i>C. maritima</i>
<i>R. acetosa</i>	<i>R. acetosa</i>	<i>Rumex acetosa</i>	<i>R. acetosa</i>	<i>R. acetosa</i>
<i>R. maritimus</i>	<i>R. maritimus</i>	<i>Rumex persicarioides</i>	<i>R. persicarioides</i>	<i>R. persicarioides</i>
	<i>P. barbatum</i>	<i>Polygonum Japonicum</i>		
		<i>Polygonum filiforme</i>		<i>P. Virginianum</i>
<i>P. Bistorta</i>	<i>P. Bistorta</i>	<i>Polygonum Bistorta</i>	<i>P. Bistorta</i>	
	<i>P. Chinense</i>	<i>Polygonum Chinense</i>		

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
	<i>P. perfoliatum</i>	<i>Polygonum perfoliatum</i> , &c.		<i>P. arifolium</i>
	<i>P. sagittatum</i> & <i>horridum</i>	<i>Polygonum Sieboldii</i>		<i>P. sagittatum</i>
<i>P. Convolvulus</i>	<i>P. Convolvulus</i>	<i>Polygonum Convolvulus</i>		<i>P. cilinode</i>
<i>P. dumetorum</i>	<i>P. pterocarpum</i> & <i>dumet.</i>	(<i>Polygonum multiflorum</i>)		<i>P. scandens</i>
<i>E. angustifolia</i> , &c.	<i>E. latifolia</i> , <i>umbellata</i> , &c.	<i>Elæagnus macrophylla</i> , <i>umbellata</i> , & 3 spp.		<i>E. argentea</i>
<i>D. Mezereum</i>	<i>D. Mezereum</i>	<i>Daphne Pseudo-Mezereum</i> , n. sp.		
<i>D. Laureola</i>	<i>D. papyracea</i> , &c.	<i>Daphne odora</i> & <i>Japonica</i>		
	S. or W. spp.	<i>Stellera</i> or <i>Wikströmia</i> , 2 spp.		
<i>Thesium</i> spp.	<i>Thesium</i> spp.	<i>Thesium decurrens</i>	<i>Comandra umbellata</i> , &c.	<i>C. umbel.</i> & <i>livida</i>
	<i>S. fragrans</i>	<i>Schœpfia jasminodora</i>		<i>Persea Carolinensis</i> ?
	<i>Machilus</i> sp.	<i>Machilus</i> , 2 spp.		<i>Sassafras officinale</i>
		<i>Benzoin trilobum</i>		<i>B. odoriferum</i>
		<i>Benzoin sericeum</i> & var.		<i>B. æstivale</i> & <i>meliss.</i>
	<i>Benzoin</i> sp.	<i>Benzoin</i> 4 spp.		<i>T. ? geniculata</i>
	<i>Tetranthera</i> spp.	<i>Tetranthera Japonica</i>	<i>Oreodaphne</i> Calif.	
	<i>Daphnidium</i> spp.	<i>Daphnidium</i> spp.		
	<i>Litsæa foliosa</i>	<i>Litsæa foliosa</i> & <i>glauca</i>		
	<i>H. cordata</i>	<i>Houttuynia cordata</i>	<i>Anemiopsis</i> Californica	
		<i>Saururus Loureiri</i>		<i>Saururus cernuus</i>
	<i>C. Indicus</i> , &c.	<i>Chloranthus inconspicuus</i> , <i>serratus</i> , & [<i>Tricerandra</i> , n. g.		
<i>C. verna</i>	<i>C. verna</i>	<i>Callitriche verna</i>	<i>C. verna</i>	<i>C. verna</i>
		<i>Pachysandra terminalis</i>		<i>P. procumbens</i>
<i>B. sempervirens</i>		<i>Buxus microphylla</i> & <i>semperv. ?</i>		
	<i>Phyllanthus</i> spp.	<i>Phyllanthus lepidocarpus</i>		<i>P. Carolinianus</i>
<i>M. annua</i>		<i>Mercurialis leiocarpa</i>		
		<i>Stillingia Japonica</i>		<i>S. ligustrina</i>
<i>E. palustris</i>	<i>E. palustris</i>	<i>Euphorbia palustris</i>		<i>E. Darlingtonii</i>
<i>E. Esula</i>	<i>E. Esula</i>	<i>Euphorbia Guilielmi</i> , n. sp.	<i>E. leptocera</i>	
<i>Urtica</i> spp.	<i>Urtica</i> spp.	<i>Urtica</i> , 2 spp.		<i>Urtica</i> sp.
	<i>L. terminalis</i>	<i>Laportea terminalis</i> & <i>bulbifera</i>		<i>L. Canadensis</i>
	<i>Pilea</i> spp.	<i>Pilea petiolaris</i>		<i>P. pumila</i>
	<i>B. platyphylla</i> & <i>nivea</i>	<i>Bœhmeria platyphylla</i> , <i>nivea</i> , &c.		
	<i>V. frutescens</i>	<i>Villebrunia frutescens</i>		
	<i>Debregeasia</i> spp.	<i>Debregeasia edulis</i>		
<i>H. Lupulus</i>	<i>H. Lupulus</i>	<i>Humulus Japonicus</i>	<i>H. Lupulus</i>	<i>H. Lupulus</i>
<i>C. orientalis</i> & <i>austr.</i>	<i>C. serotina</i>	<i>Celtis Sinensis</i>		<i>C. occidentalis</i>
	<i>U. lancifolia</i>	<i>Ulmus parvifolia</i>		<i>U. crassifolia</i>
		<i>Maclura gerontogæa</i>		<i>M. aurantiaca</i>
<i>M. nigra</i>	<i>M. alba</i> ?	<i>Morus alba</i>		<i>M. rubra</i> & <i>parvifolia</i>
	<i>J. regia</i> , in Caucasus	<i>Juglans (nigra, Thunb.) ex Zucc.</i>		<i>J. nigra</i> & <i>cinerea</i>
	<i>Pterocarya Caucasica</i>	<i>Pterocarya</i> , 2 sp. & <i>Platycarya</i>		
<i>Q. Ilex</i>	<i>Querci</i> aff.	{ <i>Quercus</i> , 18 spp., — the greater part of Himalayan or E. Indian types ; but also species allied to	{ <i>Q. agrifolia</i> & <i>Q. densiflora</i> , &	{ <i>Q. Prinus</i> & <i>Q. Catesbæi</i>
<i>C. vesca</i>		<i>Castanea Japonica</i>		<i>C. vesca</i> , Amer., & <i>pumila</i>
<i>F. sylvatica</i>		<i>Fagus sylvatica</i>		<i>F. ferruginea</i>
<i>C. orientalis</i>	<i>C. viminea</i>	<i>Carpinus (Distegocarpus)</i> 4 spp.		<i>C. Americana</i>
<i>C. Avellana</i>	<i>C. heterophylla</i>	<i>Corylus heterophylla</i>	<i>C. Americana</i> , var.	<i>C. Americana</i>

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
<i>C. tubulosa</i>		(<i>Corylus Sieboldiana</i>)	<i>C. rostrata</i>	<i>C. rostrata</i>
Betula sp.		Betula spp.	B. occidentalis	Betula spp.
<i>A. viridis</i>	<i>A. viridis</i>	<i>Alnus viridis</i> & firma	<i>A. viridis</i>	<i>A. viridis</i>
	<i>Myrica</i> spp.	<i>Myrica rubra</i>	M. Californica	M. cerifera
	<i>S. Babylonica</i> ?	<i>Salix Japonica</i> & <i>Babylonica</i> ?		
<i>S. alba</i>	<i>S. alba</i>	(<i>Salix alba</i> , ex Thunb.)	S. Wrightii	
<i>S. fragilis</i>	<i>S. fragilis</i>	<i>Salix subfragilis</i> , Anders. n. sp.*		
<i>S. purpurea</i>	<i>S. purpurea</i>	<i>Salix purpurea</i> (<i>integra</i> , Thunb.)		
<i>S. amygdalina</i>	<i>S. amygdalina</i>	<i>Salix padifolia</i> , Anders. n. sp.		<i>S. amygdaloides</i>
<i>S. hastata</i> ?	<i>S. hastata</i> ?	<i>Salix viridula</i> , Anders. n. sp.	<i>S. cordata</i> ?	<i>S. cordata</i> ?
<i>S. phylicifolia</i> ?		<i>Salix Sieboldiana</i>	<i>S. phylicoides</i> ?	
<i>S. nigricans</i> ?		<i>Salix vulpina</i> , Anders. n. sp.		
<i>S. acutifolia</i>	<i>S. acutifolia</i>	<i>Salix acutifolia</i> ?		
<i>P. sylvestris</i>	<i>P. sylvestris</i>	{ <i>Pinus densiflora</i> <i>Pinus Massoniana</i>	{ <i>P. resinosa</i> ?	<i>P. resinosa</i> , &c.
<i>P. Cembra</i>	<i>P. Cembra</i>	{ <i>Pinus parviflora</i> <i>Pinus Koræensis</i>	{ <i>P. cembroides</i>	
<i>L. Europæa</i>	<i>L. Dahurica</i> & <i>Ledebourii</i>	<i>Larix leptolepis</i>	<i>L. occidentalis</i>	<i>L. Americana</i>
	<i>A. Brunoniana</i>	<i>Abies Tsuga</i>	<i>A. Canadensis</i>	<i>A. Canadensis</i>
<i>A. pectinata</i>	<i>A. Sibirica</i>	<i>Abies homolepis</i> & firma	<i>A. bracteata</i>	<i>A. balsamea</i> & <i>Fraseri</i>
<i>A. excelsa</i>	<i>A. orientalis</i>	<i>Abies Jessoensis</i> & <i>polita</i> (<i>Glyptostrobus</i> , China)	<i>A. Menziesii</i>	<i>A. alba</i> & <i>nigra</i>
		<i>Chamæcyparis squarrosa</i> , <i>pisifera</i> , &c.	<i>Sequoia</i>	<i>Taxodium</i>
		<i>Thuja orientalis</i> & <i>pendula</i>	<i>C. Nutkaensis</i>	<i>C. thyoides</i>
<i>J. communis</i>	<i>J. communis</i>	<i>Juniperus rigida</i>	<i>T. plicata</i> & <i>gigantea</i>	<i>T. occidentalis</i>
<i>J. Sabina</i>	<i>J. Sabina</i> , &c.	<i>Juniperus Chinensis</i>	<i>J. communis</i> , var.	<i>J. communis</i> , var.
	<i>Cephalotaxus</i> ?	<i>Cephalotaxus</i> , 2 spp.	<i>J. occidentalis</i>	<i>J. Virginiana</i>
<i>T. baccata</i>	<i>T. baccata</i> & <i>Wallichiana</i>	<i>Taxus cuspidata</i>	<i>T. baccata</i> & <i>brevifol.</i>	<i>T. baccata</i> v. <i>Canad.</i>
		<i>Torreya nucifera</i>	<i>T. Californica</i>	<i>T. taxifolia</i>
	<i>Podocarpus</i> spp.	<i>Podocarpus</i> , 4 spp.	[<i>Podocarpus</i> in Mexico.]	
<i>C. humilis</i>		(<i>Chamærops excelsa</i> & <i>Biroo</i>)		<i>C. Hystrix</i> & <i>Palmetto</i> .
	<i>Arisæma</i> spp.	<i>Arisæma</i> spp. 6		<i>Arisæma</i> spp. 3
		<i>Arctiodracon Japonicum</i>	<i>A. Kamtschaticum</i>	<i>Symplocarpus</i> & <i>Oront.</i>
<i>P. natans</i>	<i>P. natans</i>	<i>Potamogeton natans</i> , &c.	<i>P. natans</i> , &c.	<i>P. natans</i> , &c.
<i>Z. marina</i>		(<i>Zostera marina</i> ex Thunb.)		<i>Z. marina</i>
<i>A. Calamus</i>	<i>A. Calamus</i>	<i>Acorus gramineus</i>		<i>A. Calamus</i>
<i>S. sagittæfolia</i>	<i>S. sagittæfolia</i>	(<i>Sagittaria sagitta</i> & <i>obtusæ</i> , Thunb.)	<i>S. variabilis</i> ?	<i>S. variabilis</i> , &c.
		<i>Liparis liliifolia</i> !		<i>Liparis liliifolia</i>
	<i>O. patens</i> , &c.	<i>Oreorchis lancifolia</i>		<i>Aplectrum hyemale</i>
	<i>C. Wallichiana</i>	<i>Cremastra variabilis</i> & <i>mitrata</i>		
	<i>Calanthe</i> spp.	<i>Calanthe striata</i> & <i>discolor</i>		
<i>O. latifolia</i> & vars.	<i>O. latifolia</i> & var.	<i>Orchis latifolia</i> , var. <i>Beringiana</i>	<i>O. latifol. Beringiana</i>	
<i>C. ensifolia</i>	<i>C. ensifolia</i>	<i>Cephalanthera ensifolia</i> & var. &c.		
<i>Epipactis</i> spp.	<i>E. veratrifolia</i>	<i>Epipactis Thunbergii</i>	<i>E. Americana</i>	<i>E. Americana</i> , Tex.
		<i>Pogonia ophioglossoides</i> !		<i>P. ophioglossoides</i>
		<i>Arethusa Japonica</i> !		<i>Arethusa bulbosa</i>

* Vide Appendix, p. 450.

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
<i>S. æstivalis</i>	<i>S. australis</i>	<i>Spiranthes australis</i>	<i>Spiranthes</i> spp.	<i>S. gracilis</i>
<i>C. guttatum</i> [E. Eu.]	<i>C. guttatum</i>	<i>Cypripedium Japonicum</i>	<i>C. guttatum</i>	<i>C. guttatum</i> (N. W.) & [acaule]
	<i>I. setosa & lævigata</i>	<i>Iris setosa & lævigata</i>	<i>I. setosa</i>	<i>Dioscorea villosa</i>
	<i>Dioscorea</i> spp.	<i>Dioscorea</i> spp.		<i>Aletris farinosa</i> & <i>aurea</i>
		<i>Aletris Japonica</i>		<i>S. rotundifolia</i> , &c.
	<i>S. ovalifolia</i>	<i>Smilax</i> China, &c.	<i>S. Californica</i>	<i>S. (Coprosm.) herbacea</i>
		(<i>Smilax (Coprosmanthus) consanguinea</i>)		<i>Medeola Virginica</i>
	<i>P. obovata & quadrifolia</i>	<i>Paris hexaphylla</i>		
<i>P. quadrifolia</i>	<i>P. quadrifolia</i>	<i>Paris tetraphylla</i> n. sp.		
	(<i>Trillidium</i>)	<i>Trillium erectum</i> var. <i>Japonicum</i>	<i>T. ovatum</i>	<i>T. erectum</i>
<i>Asparagus</i> spp.	<i>Asparagus falcatus</i>	<i>Asparagus lucidus & Wrightii</i> n. sp.		
<i>P. vulgare</i>	<i>P. vulgare</i>	<i>Polygonatum vulgare</i>		
		<i>Polygonatum giganteum</i>		<i>P. giganteum</i>
<i>P. multiflorum</i> & vars.	<i>P. multiflorum</i> & vars.	<i>P. multiflorum</i> & var.		<i>P. biflorum</i>
<i>C. majalis</i>	<i>C. majalis</i>	<i>Convallaria majalis</i>		<i>C. majalis</i> (local)
<i>S. bifolia</i>	<i>S. bifolia</i>	<i>Smilacina bifolia</i> , v. <i>Kamtschat.</i>	<i>S. bifolia</i> , v. <i>Kamts.</i>	<i>S. bifolia</i> , <i>Canadensis</i>
	<i>S. trifolia</i>	<i>Smilacina trifolia</i> (Okotsk)		<i>S. trifolia</i>
	<i>S. pallida</i>	<i>Smilacina Japonica</i>	<i>S. racemosa</i>	<i>S. racemosa</i>
	<i>C. alpina</i>	<i>Clintonia Udensis</i>	<i>C. unifl. & Andrewsii</i>	<i>C. umbellata & borealis</i>
	<i>D. Pitsutum</i>	<i>Disporum sessile</i> , pullum, &c.	<i>Prosartes Smithii</i> , &c.	<i>P. lanug. & maculata</i>
<i>S. amplexifolius</i>		<i>Streptopus amplexifolius</i>	<i>S. amplexifolius</i>	<i>S. amplexifolius</i>
		<i>Streptopus roseus</i> (Okotsk)	<i>S. roseus</i>	<i>S. roseus</i>
<i>L. bulbif. & croceum</i>	<i>L. spectabile</i>	<i>Lilium bulbiferum</i> , var. <i>Thunb.</i>		<i>L. Philadelphicum</i>
<i>L. Martagon</i>	<i>L. Martagon</i>	(<i>Lilium maculatum</i> , <i>Thunb.</i>)	<i>L. superbum</i> var. ?	<i>L. superbum & Canad.</i>
	<i>L. tenuifolium</i>	<i>Lilium callosum</i>		
<i>L. candidum</i>	<i>L. Wallichianum</i>	<i>Lilium longifolium</i>		
	<i>L. Japonicum</i> ?	<i>Lilium Japonicum</i>		
	<i>L. giganteum</i>	<i>Lilium cordifolium</i>		
	<i>O. oxypetala</i>	<i>Orithya oxypetala</i>		
	<i>F. cirrhosa</i> , &c.	(<i>Fritillaria</i> ? = <i>Uvularia cirrhosa</i> , <i>Thunb.</i>)		
	<i>H. flava & graminea</i>	<i>Hemerocallis fulva</i> , &c.		
<i>G. lutea</i>	<i>G. lutea</i>	<i>Gagea triflora</i>		
<i>Scilla</i> spp.	<i>Scilla</i> spp.	(<i>Scilla orientalis & Japonica</i>)	<i>S. (Camassia) escul.</i>	<i>S. Fraseri</i>
<i>A. Schœnoprassum</i>	<i>A. Schœnoprassum</i>	<i>Allium Schœnoprassum</i>	<i>A. Schœnoprassum</i>	<i>A. Schœnoprassum</i>
		<i>Allium Thunbergii</i>		<i>A. Canadense</i>
<i>A. Victorialis</i>	<i>A. Victorialis</i>	<i>Allium Victorialis</i>		<i>A. tricoccum</i>
	<i>Fluggea</i> 3 spp.	<i>Fluggea Japonica</i> , &c.		
	<i>O. spicatus</i> , &c.	<i>Ophiopogon spicatus</i>		
	<i>Roxburghia</i> sp.	(<i>Roxburghia Japonica</i> , <i>Blume</i>)		<i>Croomia pauciflora</i>
		<i>Heloniopsis pauciflora</i> , n. gen.		<i>Helonias bullata</i>
		(<i>Helonias (Chamælirium ?) Japonica</i>)		<i>Chamælirium luteum</i>
<i>V. nigrum</i>	<i>V. nigrum</i>	<i>Veratrum nigrum</i>		<i>V. Woodii</i>
<i>V. album</i>	<i>V. album</i>	<i>Veratrum viride</i> , var.	<i>V. viride</i> , var.	<i>V. viride</i>
		<i>Juncus ziphioides</i>	<i>J. ziphioides</i>	
<i>J. effusus</i>	<i>J. effusus</i>	<i>Juncus effusus</i>	<i>J. effusus</i>	<i>J. effusus</i>
<i>L. pilosa & campestris</i>	<i>L. pilosa & campestris</i>	<i>Luzula pilosa & campestris</i>	<i>L. pilosa & campestris</i>	<i>L. pilosa & campestris</i>
	<i>C. communis</i>	<i>Commelyna polygama</i>		<i>C. Virginica</i>
<i>C. rotundus</i>	<i>C. rotundus</i>	(<i>Cyperus rotundus</i>)		<i>C. rotundus</i> var. <i>Hydra</i>

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
	<i>C. Iria</i>	(<i>Cyperus Iria</i> (microiria, Steud.) (<i>Cyperus strigosus</i> ex Thunb.)		<i>C. Iria</i> <i>C. strigosus</i>
<i>E. palustris</i>	<i>E. palustris</i>	<i>Eleocharis pileata</i>	<i>E. palustris</i> ?	<i>E. palustris</i> , var.
<i>S. lacustris</i>	<i>S. lacustris</i>	<i>Scirpus lacustris</i>	<i>S. lacustris</i> & var.	<i>S. lacustris</i>
<i>E. gracile</i>	<i>E. gracile</i>	<i>Eriophorum gracile</i>	<i>E. gracile</i>	<i>E. gracile</i> [<i>Novæ-Angliæ</i>
<i>C. præcox</i> & <i>polyrrh.</i>	<i>C. præcox</i> & <i>polyrrhiza</i>	<i>Carex præcox</i> & <i>polyrrhiza</i>		<i>C. Pennsylvan.</i> &
<i>C. pilulifera</i>		<i>Carex pilulifera</i> & <i>puberula</i> <i>Carex rostrata</i> <i>Carex stipata</i>	<i>C. stipata</i>	<i>C. rostrata</i> <i>C. stipata</i>
<i>C. remota</i>	<i>C. remota</i>	<i>Carex remota</i>	<i>C. remota</i> (Sitcha)	
<i>C. stellulata</i>	<i>C. stellulata</i>	<i>Carex stellulata</i>	<i>C. stellulata</i>	<i>C. stellulata</i> , <i>sterilis</i> , &c.
<i>C. vesicaria</i>	<i>C. vesicaria</i>	<i>Carex vesicaria</i>	<i>C. vesicaria</i>	<i>C. vesicaria</i> ?
<i>C. filiformis</i>	<i>C. filiformis</i>	<i>Carex filiformis</i> <i>Carex macrocephala</i>	<i>C. macrocephala</i>	<i>C. filiformis</i>
<i>C. muricata</i>	<i>C. muricata</i> <i>C. Doniana</i> <i>C. Royleana</i>	<i>Carex muricata</i> <i>Carex Doniana</i> <i>Carex Royleana</i> & <i>leucochlora</i> <i>Carex Wahuensis</i>	<i>C. muricata</i> (<i>C. Wahuensis</i> , Oahu)	<i>C. muricata</i> ?
<i>C. vulgaris</i> & <i>cæspitosa</i>	<i>C. cæspitosa</i> , &c. <i>C. capillacea</i>	<i>Carex Gaudichaudiana</i> <i>Carex nana</i>	<i>C. decidua</i> , <i>Pacifica</i> , &c.	<i>C. vulgaris</i> , &c.
<i>C. cryptocarpa</i>	<i>C. notha</i> <i>C. tumida</i>	<i>Carex picta</i> <i>Carex incisa</i> <i>Carex transversa</i>	<i>C. cryptocarpa</i> , &c.	
<i>C. pilosa</i>	<i>C. Jackiana</i> <i>C. olivacea</i>	<i>Carex papulosa</i> & <i>villosa</i> <i>Carex parviflora</i> { <i>Carex dispalata</i> <i>Carex confertiflora</i> <i>Carex rigens</i> & <i>Ringgoldiana</i>	<i>C. laxiflora</i> ? } <i>C. amplifolia</i>	<i>C. pubescens</i> <i>C. laxiflora</i>
<i>C. aristata</i> (orthost.)	<i>C. aristata</i> (orthostachys)	<i>Carex Bongardii</i> , Bonin Islands.	<i>C. aristata</i> ?	<i>C. granularis</i> <i>C. aristata</i>
<i>B. erucæformis</i>	<i>B. erucæformis</i>	<i>Beckmannia erucæformis</i>	<i>B. erucæformis</i>	<i>B. erucæformis</i> (W.)
<i>P. arundinacea</i>	<i>P. arundinacea</i>	<i>Phalaris arundinacea</i>	<i>P. arundinacea</i>	<i>P. arundinacea</i>
<i>A. geniculatus</i> & <i>fulvus</i>	<i>A. geniculatus</i> & <i>fulvus</i>	<i>Alopecurus geniculatus</i>	<i>A. geniculat.</i> & <i>aristul.</i>	<i>A. geniculat.</i> & <i>aristul.</i>
<i>H. borealis</i> , &c.	<i>H. borealis</i> , &c.	<i>Hierochloa borealis</i>	<i>H. borealis</i>	<i>H. borealis</i>
<i>M. effusum</i>	<i>M. effusum</i> <i>S. elongatus</i> <i>A. scabra</i>	<i>Milium effusum</i> <i>Sporobolus elongatus</i> <i>Agrostis scabra</i>	<i>S. elongatus</i> <i>A. scabra</i>	<i>M. effusum</i> <i>S. elongatus</i> <i>A. scabra</i>
<i>T. flavescens</i>	<i>T. flavescens</i>	<i>Trisetum flavescens</i> , var.	<i>T. cernuum</i>	
<i>P. pratensis</i>	<i>P. pratensis</i>	<i>Poa pratensis</i>	<i>P. pratensis</i>	<i>P. pratensis</i>
<i>P. nemoralis</i> & <i>serot.</i>	<i>P. nemoralis</i> & <i>serotina</i> <i>P. acroleuca</i> (Nepalensis)	<i>Poa nemoralis</i> , <i>serotina</i> , &c. <i>Poa acroleuca</i>	<i>P. serotina</i> & <i>nemor.</i>	<i>P. serotina</i> & <i>nemoralis</i>
<i>G. fluitans</i>	<i>G. fluitans</i> & <i>Caspia</i>	<i>Glyceria fluitans</i> & <i>Caspia</i>	<i>G. fluitans</i>	<i>G. fluitans</i>
<i>M. nutans</i>	<i>M. nutans</i>	<i>Melica nutans</i>		
<i>F. rubra</i>	<i>F. rubra</i>	<i>Festuca rubra</i> <i>Festuca pauciflora</i>	<i>F. rubra</i> <i>F. pauciflora</i> (occident.)	<i>F. rubra</i> (N.)
<i>B. patulus</i> , <i>vestit.</i> &c.	<i>B. patulus</i> , &c.	<i>Bromus Japonicus</i>		
<i>T. caninum</i>	<i>T. caninum</i>	<i>Triticum caninum</i> <i>Triticum semicostatum</i>	<i>T. caninum</i> <i>T. semicostatum</i>	<i>T. caninum</i>
<i>I. arundinacea</i>	<i>I. arundinacea</i>	<i>Imperata arundinacea</i>		<i>I. arundinacea</i> (Texas)

EUROPE.	CENTRAL & N. ASIA.	JAPAN.	W. N. AMERICA.	E. N. AMERICA.
	<i>Arundinaria</i> spp.	<i>Arundinaria Japonica</i> , [and other Grasses]	<i>A. Kurilensis</i> ?	<i>A. macrosperma</i>
<i>B. spicant</i>		<i>Blechnum spicant</i>	<i>B. spicant</i>	
		<i>Adiantum pedatum</i>	<i>A. pedatum</i>	<i>A. pedatum</i>
<i>P. Cretica</i>		<i>Pteris Cretica</i>		<i>P. Cretica</i> (S.)
<i>A. fontanum</i>		<i>Athyrium fontanum</i>		
<i>A. Filix-femina</i>	<i>A. Filix-femina</i>	<i>Athyrium Filix-femina</i> (<i>Onoclea sensibilis</i> , ex Hance !)	<i>A. Filix-femina</i>	<i>A. Filix-femina</i> <i>O. sensibilis</i>
<i>S. Germanica</i>	<i>S. Germanica</i>	<i>Struthiopteris Germanica</i>		<i>S. Germanica</i>
<i>P. vulgare</i>	<i>P. vulgare</i>	<i>Polypodium vulgare</i>	<i>P. vulgare</i>	<i>P. vulgare</i>
<i>P. aculeatum</i>		<i>Polystichum polyphlebium</i>		<i>P. aculeatum</i>
<i>L. dilatata</i> & <i>spinul.</i>	<i>L. dilatata</i> , &c.	<i>Lastrea dilatata</i>	<i>L. dilatata</i>	<i>L. dilatata</i> & <i>spinulosa</i>
<i>L. Filix-mas</i>	<i>L. Filix-mas</i>	<i>Lastrea Filix-mas</i>		<i>L. Goldianum</i>
<i>O. regalis</i>	<i>O. regalis</i> & <i>Japonica</i>	<i>Osmunda Japonica</i>		<i>O. regalis</i>
		<i>Osmunda cinnamomea</i>		<i>O. cinnamomea</i>
<i>O. vulgatum</i>	<i>O. vulgatum</i>	<i>Ophioglossum vulgatum</i> ?	<i>O. vulgatum</i> (Unalas.)	<i>O. vulgatum</i>
	<i>L. serratum</i>	<i>Lycopodium serratum</i>		
		<i>Lycopodium lucidulum</i> !		<i>L. lucidulum</i>
<i>L. Selago</i>	<i>L. Selago</i>	<i>Lycopodium Selago</i>	<i>L. Selago</i>	<i>L. Selago</i> (subalpine)
	<i>L. dendroideum</i>	(<i>Lycopodium dendroideum</i> , Okotsk)	<i>L. dendroideum</i>	<i>L. dendroideum</i>

The principal facts which this table illustrates will be apparent upon inspection, although the plan upon which it is constructed does not favor the deduction of exact numerical conclusions.

The whole number of Japanese entries is about 580

"	"	"	Asiatic	"	"	"	444; in italics, 274
"	"	"	European	"	"	"	282; " 214
"	"	"	W. American	"	"	"	216; " 162
"	"	"	E. American	"	"	"	356; " 223

It is interesting to notice that, notwithstanding the comparative proximity of Japan to Western North America, fewer of its species are represented there than in far distant Europe. Also, — showing that this difference is not owing to the separation by an ocean, — that far more Japanese plants are represented in Eastern North America than in either. It is, indeed, possible that my much better knowledge of American botany than of European may have somewhat exaggerated this result in favor of Atlantic North America as against Europe, but it could not as against Western North America.

If we regard the identical species only, in the several floras, the preponderance is equally against Western as compared with Eastern North America, but is more in favor of Europe. For the number of species in the Japanese column which likewise occur in Western North America, are about 120; in Eastern North America, 134; in Europe, 157.

Of the 580 Japanese entries, there are which have corresponding
 European representatives, a little above 0.48 per cent; of identical species, 0.27
 Western N. American representatives, about 0.37 " " " " 0.20
 Eastern " " " " " 0.61 " " " " 0.23

So geographical continuity favors the extension of identical species; but still Eastern North America has more in common with Japan than Western North America has.

The relations of this kind between the floras of Japan and of Europe are obvious enough; and the identical species are mostly such as extend continuously — as they readily may — throughout Russian Asia, some few only to the eastern confines of Europe, but most of them to its western borders. To exhibit more distinctly the features of identity between the floras of Japan and of North America, and also the manner in which these are distributed between the eastern and the western portions of our continent, — after excluding those species which range around the world in the northern hemisphere, or the greater part of it, or (which is nearly the same thing in the present view), which are unknown in Europe, — I will enumerate the remaining peculiar species which Japan possesses in common with America: —

<i>In Japan.</i>	<i>In W. N. America.</i>	<i>In E. N. America.</i>
Anemone Pennsylvanica		A. Pennsylvanica
(Coptis asplenifolia?)	C. asplenifolia	
(Trautvetteria palmata)	T. palmata	T. palmata
Caulophyllum thalictroides		C. thalictroides
Diphylleia cymosa		D. cymosa
Brasenia peltata		B. peltata
Geranium erianthum	G. erianthum	
Rhus Toxicodendron	R. Toxicodendron, var.	R. Toxicodendron
Vitis Labrusca (Thunb.)		V. Labrusca
Thermopsis fabacea	T. fabacea	
Prunus Virginiana?		P. Virginiana
Spiræa betulæfolia	S. betulæfolia	S. betulæfolia
Photinia arbutifolia, in Bonin.	P. arbutifolia	
Pyrus rivularis?	P. rivularis	
Ribes laxiflorum	R. laxiflorum	
(Penthorum sedoides, China)		P. sedoides
Cryptotænia Canadensis		C. Canadensis
Heracleum lanatum	H. lanatum	H. lanatum
(Archemora rigida?)		A. rigida
Archangelica Gmelini	A. Gmelini	A. Gmelini
Cymopterus littoralis?	C. littoralis	
Osmorrhiza longistylis	O. longistylis	O. longistylis
Echinopanax horridus	E. horridus	
Aralia quinquefolia		A. quinquefolia
Cornus Canadensis	C. Canadensis	C. Canadensis
Viburnum plicatum		V. plicatum (lantanoides)
*Achillea Sibirica	*A. Sibirica	
*Artemisia borealis	*A. borealis	*A. borealis
Vaccinium macrocarpon	V. macrocarpon	V. macrocarpon
Menziesia ferruginea	M. ferruginea	M. ferruginea
(Boschniakia glabra?)	B. glabra	
*Pleurogyne rotata	*P. rotata	*P. rotata
(Asarum Canadense?)		A. Canadense
*Polygonum Bistorta	P. Bistorta	
Rumex persicarioides	R. persicarioides	R. persicarioides
Liparis liliifolia		L. liliifolia
Pogonia ophioglossoides		P. ophioglossoides
Iris setosa	*I. setosa	
Trillium erectum, var.		T. erectum
(Smilacina trifolia)		S. trifolia
Polygonatum giganteum		P. giganteum

<i>In Japan.</i>	<i>In W. N. America.</i>	<i>In E. N. America.</i>
(<i>Streptopus roseus</i>)	<i>S. roseus</i>	<i>S. roseus</i>
<i>Veratrum viride</i>	<i>V. viride</i>	<i>V. viride</i>
<i>Juncus xiphioides</i>	<i>J. xiphioides</i>	
(<i>Cyperus Iria</i>)		<i>C. Iria</i>
<i>Carex rostrata</i>		<i>C. rostrata</i>
<i>Carex stipata</i>	<i>C. stipata</i>	<i>C. stipata</i>
<i>Carex macrocephala</i>	<i>C. macrocephala</i>	
<i>Sporobolus elongatus</i>	<i>S. elongatus</i>	<i>S. elongatus</i>
<i>Agrostis scabra</i>	<i>A. scabra</i>	<i>A. scabra</i>
<i>Festuca pauciflora</i>	<i>F. pauciflora</i>	
<i>Adiantum pedatum</i>	<i>A. pedatum</i>	<i>A. pedatum</i>
<i>Onoclea sensibilis</i>		<i>O. sensibilis</i>
<i>Osmunda cinnamomea</i>		<i>O. cinnamomea</i>
<i>Lycopodium lucidulum</i>		<i>L. lucidulum</i>
(<i>Lycopodium dendroideum</i>)	<i>L. dendroideum</i>	<i>L. dendroideum</i>

The names enclosed in parentheses are of species which I have not seen from Japan ; some of them inhabit the adjacent mainland ; some are imperfectly identified. Those marked * are high northern species in America.

Of these 56 extra-European species, 34 inhabit Western, and 41 Eastern North America. And 15 are Western, and not Eastern ; 22 Eastern, and not Western ; and 19 common to both sides of the continent. About eight or nine of these 56 species extend eastward into the interior of Asia.

On the other hand, the only species which I can mention as truly indigenous both to Japan and to Europe, but not recorded as ranging through Asia, are

<i>Euonymus latifolius</i> ,	<i>Fagus sylvatica</i> ,	<i>Blechnum Spicant</i> ,
<i>Valeriana dioica</i> ,	<i>Streptopus amplexifolius</i> ,	<i>Athyrium fontanum</i> .
<i>Pyrola media</i> ,		

Two of these species extend across the northern part of the American continent, and on to the Asiatic ; another occurs on the northwest coast of America ; and another, the *Fagus*, is represented, in Eastern America, by a too closely related species. It is noteworthy, that not one of these seven plants is of a peculiarly European genus, or even a Europæo-Siberian genus ; — while of the fifty-six species of the Americo-Japanese region wanting in Europe, twenty are of extra-European genera ; seventeen are of genera restricted to the North American, East Asian, and Himalayan regions (except that *Brasenia* has wandered to Australia) ; fourteen of the genera (most of them monotypic) are peculiar to America and Japan or the districts immediately adjacent ; one is peculiar to our northwest coast and Japan ; and eight are monotypic genera wholly

peculiar (*Brasenia* excepted) to the Atlantic United States and Japan. Add to these the similar cases of other American species (nearly all of them peculiarly Atlantic-American) which have been detected in the Himalayas or in Northern Asia, — such as *Menispermum Canadense* (*Dauricum*, DC.), *Amphicarpæa monoica*? *Clitoria Mariana*, *Osmorrhiza brevistylis*, *Monotropa uniflora*, *Phryma leptostachya*, *Tipularia discolor*? &c., — and it will be almost impossible to avoid the conclusion, that there has been a peculiar intermingling of the Eastern American and Eastern Asian floras, which demands explanation.

The case might be made yet stronger by reckoning some subgeneric types as equivalent to generic in the present view, and by distinguishing those species or genera which barely enter the eastern borders of Europe; e. g. *Cimicifuga fetida*, *Mæhringia lateriflora*, *Geum strictum*, *Spiræa salicifolia*, &c.

It will be yet more strengthened, and the obvious conclusion will become irresistible, when we take the nearly allied, as well as the identical, species into account. And also when we consider that, after excluding the identical species, only 15 per cent of the entries in the European column of the detailed tabular view are in italic type (i. e. are *closely* representative of Japanese species); while there are 22 per cent of this character in the American column.

For the latter, I need only advert to some instances of such close representation, as of

<i>Trollius patulus</i>	by	<i>T. Americanus</i> ,	<i>Astilbe Thunbergii</i> & <i>Japonica</i>	by	<i>A. decandra</i> ,
<i>Aquilegia Burgeriana</i>	“	<i>A. Canadensis</i> ,	<i>Mitchella undulata</i>	“	<i>M. repens</i> ,
<i>Rhus vernicifera</i>	“	<i>R. venenata</i> ,	<i>Hamamelis Japonica</i>	“	<i>H. Virginica</i> ,
<i>Celastrus scandens</i>	“	<i>C. articulatus</i> ,	<i>Olethra barbinervis</i>	“	<i>C. acuminata</i> ,
<i>Negundo cissifolium</i>	“	<i>N. aceroides</i> ,	<i>Rhododendron brachycarpum</i>	“	<i>R. Catawbiense</i> ,
<i>Sophora Japonica</i>	“	<i>S. affinis</i> ,	<i>Amsonia elliptica</i>	“	<i>A. Tabernæmontana</i> ,
<i>Sanguisorba tenuifolia</i>	“	<i>S. Canadensis</i> ,	<i>Saururus Loureiri</i>	“	<i>S. cernuus</i> ,

and many others of the same sort, — several of which, when better known, may yet prove to be conspecific; while an equally large number could be indicated of species which, although more positively different, are yet no less striking counterparts.

To demonstrate the former proposition, I have only to contrast the extra-American genera common to Europe and Japan with the extra-European genera common to North America and Japan. The principal European genera of this category are *Adonis*, *Epimedium*, *Chelidonium*, *Malachium*, *Lotus*, *Anthriscus*, *Hedera*, *Asperula*, *Rubia*, *Carpesium*, *Ligularia*, *Lampsana*, *Picris*, *Pæderota*, *Ajuga*, *Thymus*, *Nepeta*, *Lamium*, *Ligustrum*, *Kochia*? *Daphne*, *Thesium*, *Buxus*, *Mercurialis*, *Cephalanthera*, *Paris*, *Asparagus*, — to which may as well be added *Pæonia* and *Bupleurum*, the former having a representative on the mountains, and the latter in the arctic regions, of Western

America, but both absent from the rest of our continent. Excepting *Pæderota* and *Buxus* (the latter a rather doubtful native of Eastern Asia), none of these genera are peculiar to Europe, but all extend throughout Asia and elsewhere over large parts of the world.

The following incomplete list of North American genera or peculiar subgeneric types represented in Japan and its vicinity, but unknown in Europe, presents a very different appearance. Those which are absent from the flora of Western North America are italicized.

Trautvetteria	Philadelphus	<i>Asarum</i> § <i>Heterotropa</i>
Cimicifuga (barely reaches Europe)	<i>Penthorum</i>	<i>Phytolacca</i>
<i>Illicium</i>	<i>Hamamelis</i>	<i>Benzoin</i> & <i>Sassafras</i> ?
<i>Magnolia</i>	<i>Liquidambar</i>	Tetranthera
<i>Cocculus</i> & <i>Menispermum</i> ?	<i>Cryptotania</i>	<i>Saururus</i>
Mahonia	Cymopterus?	<i>Pachysandra</i>
<i>Caulophyllum</i>	<i>Archemora</i>	<i>Laportea</i>
<i>Diphylleia</i>	Osmorrhiza	<i>Pilea</i>
<i>Brasenia</i>	Aralia & § <i>Ginseng</i>	<i>Bæhmeria</i>
<i>Nelumbium</i>	Echinopanax	<i>Microptelea</i>
Dicentra	<i>Diervilla</i>	<i>Maclura</i>
<i>Stuartia</i> (& <i>Gordonia</i> ?)	<i>Mitchella</i>	<i>Juglans</i>
<i>Zanthoxylum</i>	<i>Oldenlandia</i>	Abies § Tsuga
<i>Cissus</i>	(Siegesbeckia, in Mexico)	Chamæcyparis
<i>Ampelopsis</i>	<i>Cacalia</i> (reaches E. Europe)	Torreya
<i>Berchemia</i>	Gaultheria	<i>Arisæma</i>
Æsculus	<i>Leucothoe</i>	Arctiodracon
<i>Sapindus</i>	<i>Pieris</i>	<i>Pogonia</i>
Negundo	<i>Clethra</i>	<i>Arethusa</i>
Thermopsis	Menziesia	<i>Dioscorea</i>
<i>Wistaria</i>	<i>Symplocos</i>	<i>Aletris</i>
<i>Desmodium</i>	<i>Ardisia</i>	<i>Coprosmanthus</i>
<i>Lespedeza</i>	Boschniakia	Trillium
<i>Rhynchosia</i>	<i>Catalpa</i>	Clintonia
Sophora	<i>Tecoma</i>	Streptopus § Hekorima
Photinia	Dicliptera	<i>Chamælirium</i> ?
<i>Astilbe</i>	<i>Leptandra</i>	Sporobolus
Mitella	<i>Callicarpa</i>	<i>Arundinaria</i>
<i>Hydrangea</i>	<i>Cedronella</i>	Adiantum
<i>Itea</i>	<i>Amsonia</i>	<i>Onoclea</i>

Here are about 90 extra-European genera or forms, 65 of which are absent from Western North America out of the tropics (the latter comprising a very large part of

the most striking representative species), and almost as many more are divided between North America and extra-tropical (chiefly Northern and Eastern) Asia. About 40 of the latter are genera or groups of single, or of two or few closely related species, peculiar, or nearly peculiar, to the regions just mentioned.

This list should be supplemented by those additional North American genera which have one or more closely representative species in the Himalayan region only, such as *Podophyllum*, *Pyrularia*, &c.; and also by the numerous cases in which Eastern-American plants are represented in the Himalayo-Japanese region by strikingly cognate, although not congeneric species; such as our *Macrotys* by *Pityrosperma*; *Schizandra* by *Kadsura* and *Sphærostema*; *Neviusia* by *Kerria* and *Rhodotypos*; *Calycanthus* by *Chimonanthus*; *Cornus florida* by *Benthamia*; *Prosartes* by *Disporum*; *Helonias* by *Heloniopsis*; and so of others, which have been mentioned in the former part of this memoir, and exhibited in the accompanying tabular view.

I had long ago, in Silliman's Journal, presented some data illustrative of this remarkable parallelism, and also more recently, in my "Statistics of the Flora of the Northern United States" (Vol. 22, Second Series); where I had noticed the facts, — 1. that a large percentage of our extra-European types are shared with Eastern Asia; and 2. that no small part of these are unknown in Western North America. But Mr. Bentham was first to state the natural conclusion from all these data, — though I know not if he has even yet published the remark, — viz. that the interchange between the temperate floras even of the western part of the Old World and of the New has mainly taken place *via* Asia. Notwithstanding the few cases which point in the opposite direction (e. g. *Eriocaulon septangulare*, *Spartina*, *Subularia*, *Betula alba*), the general statement will be seen to be well sustained. Also, in the Journal of the Proceedings of the Linnæan Society, 2. p. 34, Mr. Bentham "calls to mind how frequently large American genera (such as *Eupatorium*, *Aster*, *Solidago*, *Solanum*, &c.) are represented in Eastern Asia by a small number of species, which gradually diminish or altogether disappear as we proceed westward toward the Atlantic limits of Europe; whilst the types peculiar to the extreme west of Europe (excluding of course the Arctic flora) are wholly deficient in America. These are among the considerations which suggest an ancient continuity of territory between America and Asia, under a latitude, or at any rate with a climate, more meridional than would be effected by a junction through the chains of the Aleutian and the Kurile Islands."

I shall presently state why connection in a more meridional latitude need not be supposed.

The deficiency in the temperate American flora of forms at all peculiar to Western

Europe is almost complete, and is most strikingly in contrast with the large number of Eastern American forms repeated or represented in Eastern Asia. Of genera divided between Eastern North America and Europe, I can mention only *Ostrya*, *Narthecium*, *Psamma*, the maritime *Cakile*, and perhaps *Scolopendrium*. *Hottonia* might have been added, but for a species accredited to Java. And if we extend the range across our continent, we add only *Cercis* and *Læflingia*. Of the ampler genera at all characteristic of the European flora, I can enumerate from the Flora of the Northern United States nothing more important than *Helianthemum* and *Valerianella*, two or three species of each, (but those of the former hardly congeners of the European ones,) adding that *Hieracia* and perhaps *Cirsia* are somewhat more plentiful in Eastern than in Western America. Let it also be noted, that there are even fewer Western-European types in the Pacific than in the Atlantic United States, notwithstanding the similarity of the climate!

That representation by allied species of genera peculiar, or nearly peculiar, to two regions, furnishes evidence of similar nature and of equal pertinency with representation by identical species, will hardly be doubted. Whether or not susceptible of scientific explanation, it is certain that related species of phænogamous plants are commonly associated in the same region, or are found in comparatively approximate (however large) areas of similar climate.* Remarkable exceptions may indeed be adduced; but the fact that they are remarkable goes to confirm the proposition. Indeed, the general expectation of botanists in this regard sufficiently indicates the common, implicit opinion. The discovery of a new *Sarracenia* or a new *Halesia* in the

* The fundamental and most difficult question remaining in natural history is here presented;—the question whether this actual geographical association of congeneric or other nearly related species is primordial, and therefore beyond all scientific explanation, or whether even this may be to a certain extent a natural result. The only noteworthy attempt at a scientific solution of the problem, aiming to bring the variety as well as the geographical association of existing species more within the domain of cause and effect, is that of Mr. Darwin and (later) of Mr. Wallace,—partially sketched in their short papers “On the Tendency of Species to form Varieties, and on the Perpetuation of Varieties and Species by natural Means of Selection,” in the Journal of the Proceedings of the Linnæan Society, Vol. 3 (Zoölogy), p. 45. The views there suggested must bear a prominent part in future investigations into the distribution and probable origin of species. It will hardly be doubted that the tendencies and causes indicated are really operative; the question is as to the extent of their operation. But I am already disposed, on these and on other grounds, to admit that what are termed closely related species may in many cases be lineal descendants from a pristine stock, just as domesticated races are; or, in other words, that the limits of occasional variation in species (if by them we mean primordial forms) are wider than is generally supposed, and that derivative forms when segregated may be as constantly reproduced as their originals.

Atlantic United States, or of a new *Eschscholtzia*, *Platystemon*, or *Calais* west of the Rocky Mountains, would excite no surprise. A converse discovery, or the detection of any of these genera in a remote region, would excite great surprise. The discovery of numerous closely related species thus divided between two widely separated districts might not, in the present state of our knowledge, suggest former continuity, migration, or interchange; but that of identical species peculiar to the two inevitably would.

Why should it? Evidently because the natural supposition is that individuals of the same kind are descendants from a common stock, or have spread from a common centre; and because the progress of investigation, instead of eliminating this preconception from the minds of botanists, has rather confirmed it. Every other hypothesis has derived its principal support from difficulties in the application of this. A review of what has been published upon the subject of late years makes it clear that the doctrine of the local origin of vegetable species has been more and more accepted, although, during the same period, species have been shown to be much more widely dispersed than was formerly supposed. Facts of the latter kind, and the conclusions to which they point, have been most largely and cogently brought out by Dr. Hooker, and are among the very important general results of his extensive investigations. And the best evidence of the preponderance of the theory of the local origin of species, — notwithstanding the great increase of facts which at first would seem to tell the other way, — is furnished by the works of the present De Candolle upon geographical botany. This careful and conscientious investigator formerly adopted and strenuously maintained Schouw's hypothesis of the double or multiple origin of species. But in his great work, the *Géographie Botanique Raisonnée*, published in the year 1855, he has in effect discarded it, and this not from any theoretical objections to that view, but because he found it no longer needed to account for the general facts of distribution. This appears from his qualified, though dubious, adherence to the hypothesis of a double origin, as a *dernier resort*, in the few and extraordinary cases which he could hardly explain in any other way. His decisive instance, indeed, is the occurrence of the Eastern American *Phryma leptostachya* in the Himalaya Mountains.

The facts presented in the present memoir effectually dispose of this subsidiary hypothesis, by showing that the supposed single exception belongs to a not uncommon case. Indeed, so many species are now known to be common to Eastern and Northern Asia and Eastern North America, — some of them occurring also in Northwestern America and some not, — and so many genera are divided between these two regions, that the antecedent improbability of such occurrence is done away, and more cases of the kind may be confidently expected. However others may regard them, it is clear

that De Candolle would now explain these cases in accordance with the general views of distribution adopted by him, under which they naturally fall, — so abandoning the notion of a separate creation.

I know not whether any botanist continues to maintain Schouw's hypothesis. But its elements have been developed into a different and more comprehensive doctrine, that of Agassiz, which should now be contemplated. It may be denominated the *autochthonal* hypothesis.

In place of the ordinary conception, that each species originated in a local area, whence it has been diffused, according to circumstances, over more or less broad tracts, — in some cases becoming widely discontinuous in area through climatic or other physical changes operating during a long period of time, — Professor Agassiz maintains, substantially, that each species originated where it now occurs, probably in as great a number of individuals occupying as large an area, and generally the same area, or the same discontinuous areas, as at the present time.

This hypothesis is more difficult to test, because more ideal than any other. It might suffice for the present purpose to remark, that, in referring the actual distribution, no less than the origin, of existing species simply to the Divine will, it would remove the whole question out of the field of inductive science. Regarded as a *philosophical* question, Maupertuis's well-known "principle of least action" might be legitimately urged against it; namely, "that it is inconsistent with our idea of Divine wisdom, that the Creator should use more power than was necessary to accomplish a given end." This philosophical principle holds so strictly true in all the mechanical adaptations of the universe, as Professor Peirce has shown, that we cannot think it inapplicable to the organic world also, and especially to the creation of beings endowed with such enormous multiplying power, and such means and facilities for dissemination, as most plants and animals. Why then should we suppose the Creator to do that supernaturally which would be naturally effected by the very instrumentalities which he has set in operation?

Viewed, however, simply in its *scientific* applications to the question under consideration, (the distribution of plants in the temperate zone of the northern hemisphere,) the autochthonal hypothesis might be tested by inquiring whether the primitive or earliest range of our species could possibly have remained unaffected by the serious and prolonged climatic vicissitudes to which they must needs have been subject; and whether these vicissitudes, and their natural consequences, may not suffice to explain the partial intermingling of the floras of North America and Northern Asia, upon the supposition of the local origin of each species. Let us bring to the inquiry

the considerations which Mr. Darwin first brought to bear upon such questions, and which have been systematically developed and applied by the late Edward Forbes, by Dr. Hooker, and by Alphonse De Candolle.

No one now supposes that the existing species of plants are of recent creation, or that their present distribution is the result of a few thousand years. Various lines of evidence conspire to show that the time which has elapsed since the close of the tertiary period covers an immense number of years; and that our existing flora may in part date from the tertiary period itself. It is now generally admitted that about 20 per cent of the Mollusca of the middle tertiary (miocene epoch), and 40 per cent of the pliocene species on the Atlantic coast still exist; and it is altogether probable that as large a portion of the vegetation may be of equal antiquity. From the nature of the case, the direct evidence as respects the flora could not be expected to be equally abundant. Still, although the fossil plants of the tertiary and post-tertiary of North America have only now begun to be studied, the needful evidence is not wanting.

On our northwestern coast, in the miocene of Vancouver's Island, among a singular mixture of species referable to *Salix*, *Populus*, *Quercus*, *Planera*, *Diospyros*, *Salisburia*, *Ficus*, *Cinnamomum*, *Persoonia* or other *Proteaceæ*, and a Palm (the latter genera decisively indicating a tropical or subtropical climate), Mr. Lesquereux has identified one existing species, a tree characteristic of the same region ten or fifteen degrees farther south, viz. the Redwood or *Sequoia sempervirens*. In beds at Somerville referred to the lower or middle pliocene by Mr. Lesquereux, this botanist has recently identified the leaves of *Persea Carolinensis*, *Prunus Caroliniana*, and *Quercus myrtifolia*, now inhabiting the warm sea-coast and islands of the Southern States.*

The pliocene quadrupeds of Nebraska also show that the climate east of the Rocky Mountains at this epoch was much warmer than now. About the Upper Missouri and Platte there were then several species of Camel (*Procamelus*) and allied Ruminantia, and a Rhinoceros, besides a Mastodon, an Elephant, some Horses and their allies, not to mention a corresponding number of carnivorous animals. These herbivora probably fed in a good degree upon herbage and grasses of still existing species. For herbs and grasses are generally capable of enduring much greater climatic changes, and are therefore likely to be even more ancient, than trees. These animals must have had at least a warm-temperate climate to live in: so that in lat. 40° – 43° they could not have been anywhere near the northern limit of the temperate flora of those

* These and other data, obligingly communicated by Mr. Lesquereux, will be published in the May number of the American Journal of Science and Arts.

days; indeed the temperate flora, which now in Western Europe touches the Arctic Circle, must then have reached equally high latitudes in Central or Western North America. In other words, the temperate floras of America and Asia must then have been conterminous (with small oceanic separation), and therefore have commingled, as conterminous floras of similar climate everywhere do.

At length, as the post-tertiary opened, the glacier epoch came slowly on, — an extraordinary refrigeration of the northern hemisphere, in the course of ages carrying glacial ice and arctic climate down nearly to the latitude of the Ohio. The change was evidently so gradual that it did not destroy the temperate flora, at least not those enumerated above as existing species. These and their fellows, or such as survive, must have been pushed on to lower latitudes as the cold advanced, just as they now would be if the temperature were to be again lowered; and between them and the ice there was doubtless a band of subarctic and arctic vegetation, — portions of which, retreating up the mountains as the climate ameliorated and the ice receded, still scantily survive upon our highest Alleghanies, and more abundantly upon the colder summits of the mountains of New York and New England: — demonstrating the existence of the present arctic-alpine vegetation during the glacial era; and that the change of climate at its close was so gradual that it was not destructive to vegetable species.

As the temperature rose, and the ice gradually retreated, the surviving temperate flora must have returned northward *pari passu*, and — which is an important point — must have advanced much farther northward, and especially northwestward, than it now does; so far, indeed, that the temperate floras of North America and of Eastern Asia, after having been for long ages most widely separated, must have become a second time conterminous. Whatever doubts may be entertained respecting the existence of our present vegetation generally before the glacial era, its existence immediately after that period will hardly be questioned. Here, therefore, may be adduced the direct evidence recently brought to light by Mr. Lesquereux, who has identified our Live Oak (*Quercus virens*), Pecan (*Carya olivæformis*), Chinquapin (*Castanea pumila*), Planer-tree (*Planera Gmelini*), Honey-Locust (*Gleditschia triacanthos*), *Prinos coriaceous*, and *Acorus Calamus*, — besides an Elm and a *Ceanothus* doubtfully referable to existing species, — on the Mississippi, near Columbus, Kentucky, in beds which Mr. Lesquereux regards as anterior to the drift. Professor D. D. Owen has indicated their position “as about 120 feet lower than the ferruginous sand in which the bones of the *Megalonyx Jeffersonii* were found.” So that they belong to the period immediately succeeding the drift, if not to that immediately preceding it. All the vegetable remains of this deposit, which have been obtained in a determinable condition, have been referred, either positively or

probably, to existing species of the United States flora, most of them now inhabiting the region a few degrees farther south.

If, then, our present temperate flora existed at the close of the glacial epoch, the evidence that it soon attained a high northern range is ready to our hand. For then followed the second epoch of the post-tertiary, called the *fluvial* by Dana, when the region of the St. Lawrence and Lake Champlain was submerged, and the sea there stood five hundred feet above its present level; when the higher temperate latitudes of North America, and probably the arctic generally, were less elevated than now, and the rivers vastly larger, as shown by the immense upper alluvial plains, from fifty to three hundred feet above their present beds; and when the diminished breadth and lessened height of northern land must have given a much milder climate than the present.

Whatever the cause, the milder climate of the fluvial epoch is undoubted. Its character, and therefore that of the vegetation, is decisively shown, as geologists have remarked, by the quadrupeds. While the *Megatherium*, *Mylodon*, *Dicotyles*, &c. demonstrate a warmer climate than the present in the Southern and Middle United States, the *Elephas primigenius*, ranging from Canada to the very shores of the Arctic Ocean, equally proves a temperate climate and a temperate flora in these northern regions. This is still more apparent in the species of the other continent, where, in Siberia, not only the *Elephas primigenius*, but also a Rhinoceros, roamed northward to the arctic sea-coast. The quadrupeds that inhabited Europe in the same epoch are well known to indicate a warm-temperate climate as far north as Britain, in the middle, if not the later post-tertiary. North America then had its herds of Mastodons, Elephants, Buffaloes or Bisons of different species, Elks, Horses, *Megalonyx*, the Lion, &c.; and, from the relations between this fauna and that of Europe, there is little doubt that the climate was as much milder than the present on this as on the other side of the ocean. All the facts known to us in the tertiary and post-tertiary, even to the limiting line of the drift, conspire to show that the difference between the two continents as to temperature was very nearly the same then as now, and that the isothermal lines of the northern hemisphere curved in the directions they now do.

A climate such as these facts demonstrate for the fluvial epoch would again commingle the temperate floras of the two continents at Behring's Straits, and earlier — probably through more land than now — by way of the Aleutian and Kurile Islands. I cannot imagine a state of circumstances under which the Siberian Elephant could migrate, and temperate plants could not.

The fluvial was succeeded by the "*terrace* epoch," as Dana names it, "a time of transition towards the present condition, bringing the northern part of the continent

up to its present level, and down to its present cool temperature," * — giving the arctic flora its present range, and again separating the temperate floras of the New and of the Old World to the extent they are now separated.

Under the light which these geological considerations throw upon the question, I cannot resist the conclusion, that the extant vegetable kingdom has a long and eventful history, and that the explanation of apparent anomalies in the geographical distribution of species may be found in the various and prolonged climatic or other physical vicissitudes to which they have been subject in earlier times; — that the occurrence of certain species, formerly supposed to be peculiar to North America, in a remote or antipodal region affords of itself no presumption that they were originated there; — and that the interchange of plants between Eastern North America and Eastern Asia is explicable upon the most natural and generally received hypothesis, (or at least offers no greater difficulty than does the Arctic flora, the general homogeneousness of which round the world has always been thought compatible with local origin of the species,) and is perhaps not more extensive than might be expected under the circumstances. That the interchange has mainly taken place in high northern latitudes, and that the isothermal lines have in earlier times turned northward on our eastern, and southward on our northwest coast, as they now do, are points which go far towards explaining why Eastern North America, rather than Oregon and California, has been mainly concerned in this interchange, and why the temperate interchange, even with Europe, has principally taken place through Asia.

* For the collocation and communication of the geological data here presented, I am indebted to the kindness of my friend, Professor Dana.

* * On page 425, after line 6, insert *Brasenia peltata* in the Asiatic, Japanese, Western North American, and Eastern North American columns. To the remarks upon the known range of this species, I have now to add the interesting fact, that it exists upon the northwestern coast of America, having been gathered by Dr. Pickering, in Wilkes's South Sea Exploring Expedition, in a stream which falls into Gray's Harbor, lat. 47°. It must be local on the western side of the continent, or it would have been met with before. When this remarkable plant was known to occur only in Eastern North America and Eastern Australia, it made the strongest case in favor of double creation that perhaps has ever been adduced. But since it has been found to occur throughout the Eastern Himalayas and in Japan, and has now been detected in Northwestern America also, the case seems to crown the conclusions to which this memoir arrives.

Page 428, line 11, in the Asiatic column, add *Osmorrhiza brevistylis*.

APPENDIX.

SALICES e Japonia, quas descripsit N. J. ANDERSSON Holmiensis.

1. *SALIX JAPONICA*, *Thunb. Fl. Jap.* p. 24; *Gray in Perry, Jap. Exped.* 2. p. 319: amentis sessilibus nudis cylindricis acutiusculis, defloratis valde elongatis flexuosis gracillimis; squamis ovatis concoloribus testaceis glabriusculis capsulam fere dimidiam æquantibus; capsulis ovatis obtusis glabris subsessilibus; stylo minuto glabro; stigmatibus integris; foliis lanceolatis cuspidatis acute serratis glabris subtus pallidioribus. — Hab. juxta Nagasaki et alibi, *Thunberg.* Hakodadi, *Williams & Morrow.*

Arbor mediocris ex *Thunb.* Rami graciles, torulosi, cortice flavo-cinerascente glabro nitente obducti. Folia bipollicaria et minora, juniora interdum utrinque pilis raris et caducis conspersa, anguste lanceolata, apice sub-obliquo cuspidato-acuminata; adulta latiora, apice brevius cuspidata, utrinque glaberrima, subtus pallidiora vel immo fere glaucescentia, venis pulchre anastomosantibus reticulato-venulosa, margine acute serrata, serraturis productis. Amenta (fœminea et efflorata tantum vidi) numerosa, condensata, usque ad 4 poll. longa, patentia, laxè flexuosa, bracteis subnullis suffulta; rhachis hirta; squamæ vix lineam longæ, pallide testacæ, obtusæ, concolores. Capsulæ lineæ longiores, basi ovata crassæ, gibbæ, apice subtruncato obtusæ, testaceo-rufescentes, glaberrimæ: pedicellus obsoletus: stylus vix productus: stigma crassiuscula.

Specimina hic descripta in herbario proprio Thunbergii Upsaliæ asservata, a *Salice Babylonica* — cui capsulis et squamis earum fere omnino congruit — foliis brevibus exacte late lanceolatis (non lineari-lanceolatis) acute et sat dense serratis, serraturis evidenter productis, amentis eximie numerosis et confertis, longissimis et laxissimis, luculenter differt. In herbario autem Holmiensi et musei Parisiensis specimina plurima foliifera vidi e Japonia a Thunbergio reportata et communicata, sine ullo dubio ad *S. Babylonicam* veram referenda, sed *S. Japonica* etiam a Thunbergio inscripta. Quæ quum ita sint de vera specie *S. Japonicæ*, Thunb. non parum sum incertus.

2. *SALIX BABYLONICA*, *L. Spec. p.* 1473. E pluribus locis Japoniæ in herbariis variis (semper *S. Japonica* appellata) a Thunbergio ipso communicatam vidi. In China frequenter culta, et inde forsan in Japoniam immigrata.

3. *SALIX ALBA*, *L. Spec. p.* 1479; *Thunb. Fl. Jap. p.* 25. Nulla specimina e Japonia unquam vidi; in herbario Thunbergii non adest.

4. *SALIX SUBFRAGILIS*, *Anders. sp. nov.?* Hab. ad Hakodadi Japoniæ legerunt *Williams & Morrow.* (Hb. A. Gray.) Specimen mancum *Salici* nostræ *fragili* tam simile ut vix ab ea sit distinguendum.

Amenta (fœminea) brevissima, pedunculata, bracteis paucis subspathulatis integris glabris suffulta, vix pollicem longa, recurvata, subdensiflora, obtusiuscula; rhachis hirsuta: squamæ concolores pallide flavescentes, lanceolato-lineares, obtusæ glabræ, capsulas initio omnino tegentes. Capsulæ viridulæ subsessiles, ovato-conicæ, glabræ vel basi interdum puberulæ, stylo producto rostratæ, stigmatibus integris excurvatis. Folia (novella tantum vidi) lanceolata, glabra, vel subtus pilis adpressis hirsuta, margine integra, venis obscurioribus percursa.

5. *SALIX PURPUREA*, *L. Spec. p.* 1477. *S. integra*, *Thunb. Fl. Jap. p.* 27, sec. specimina in herb. propr. Thunb. (Capsulæ valde crassæ, adpresse albo-tomentosæ : folia rotundato-obtusata, subtus crebre albo-punctata.)

Sub nomine *S. integra*, Thunb. in herb. Hook. specimen vidi depauperatum, de quo hæc annotavi : “*Salice repente* in Europa vulgatissimæ proxima videtur, præsertim varietati hujus maxime insigni *arenariæ* : folia tamen lingulata, basi valde contracta, margine acute revoluta, acutissime et dense sed non profunde serrulata, vel potius denticulata, supra obscure viridia costa tamen alba, subtus argenteo-sericea costis et venis elevatis, ob nervos transversim connexos pulchre reticulatim areolata.” Specimina mihi hodie non adsunt, quam ob rem de hac forma nil certe enuntiare audeo.

6. *SALIX PADIFOLIA*, *Anders. sp. nov.* : amentis sessilibus præcocibus gracilibus flexuosis breviusculis ; squamis concoloribus glaberrimis ; capsulis subcylindricis vel ovato-conicis glaberrimis, pedicello nectarium bis terve superantibus ; stylo parvo ; stigmatibus integris brevissimis ; foliis ovato-lanceolatis cuspidato-acuminatis utrinque glaberrimis subtus glaucescentibus margine serrulatis. — Hab. ad Simoda legerunt *Williams & Morrow*. (Hb. A. Gray.)

Arbor videtur sat procera. Rami graciles, læves, cortice castaneo glabro obducti. Folia 2 – 3 poll. longa, ad medium 1 – 1½ poll. lata, basi rotundata sæpius subcordata, apice in cuspidem obliquum abrupte producta, supra saturate viridia, subtus opace glaucescentia, costa fulva percursa, margine plus minusve sed non profunde serrulata ; petiolus 2 lin. longus, planiusculus, glaber. Amenta (fœminea tantum vidi) anguste cylindrica, arrecto-patentia, flexuosa, laxiuscula, densiflora, deflorata 3 – 3½ poll. longa, 2 – 3 lin. crassa, subsessilia, bracteis minutis 2 – 3 subtus hirsutis suffulta. Capsulæ testaceo-viridulæ, 1 lin. longæ, omnino glabræ, basi crassiores, ceterum subcylindricæ, obtusiusculæ ; pedicellis glabris nectarium ovatum sat crassum ter superans. Stylus pedicello duplo brevior, glaber : stigmata brevissima, crassiuscula, integra. Squamæ lingulatæ, testaceæ, glaberrimæ, ventrem capsularum superantes.

Hæc species quoad habitum, formam, consistentiam et glabritiem foliorum ad *S. amygdalinam* ita proxime accedit ut vix, nisi amentis longissimis et gracillimis, pedunculo nullo foliato infixis, tute distinguatur ! Folia tamen non subtus reticulato-venulosa.

7. *SALIX VIRIDULA*, *Anders. sp. nov.* Hab. ad Yokuhama legerunt *Williams & Morrow*. (Hb. A. Gray.)

Amenta (mascula) brevè pedunculata, foliis paucis suffulta, arrecta, subdensiflora, cylindrica, acutiuscula, e basi florentia ; rhachis cinereo-hirsuta : squamæ oblongo-spathulatæ, pallide testaceæ, concolores, convexæ, glabræ, apice rotundatæ : stamina gemina ; filamentis longis squamas duplo superantibus pallidis ; antheris sat magnis rotundatis. Folia fere pollicaria, semipollicem lata, subsessilia, exacte ovalia, basi subrotundata, apice nonnunquam parum producta, margine integra vel serrulata, serraturis acutis glanduligeris adpressis, utrinque glaberrima, pallide virescentia, venis anastomosantibus pulchre reticulato-areolata, subtus parum pallidiora.

Si cuidam nostratum sit comparanda *S. hastatæ* quoad habitum proxima. In utraque folia ovalia, brevissime petiolata, virescentia, præsertim subtus reticulato-venulosa : amenta mascula etiam haud dissimilia, sed squamæ concolores, quare etiam *S. amygdalinam* nonnihil refert.

8. *SALIX SIEBOLDIANA*, *Blume, Bijdr. p.* 517 ; *Gray in Perry, l. c.* : amentis sessilibus nudiusculis erectiusculis densifloris ; squamis lanceolato-linearibus testaceis concoloribus margine pilis conspersis, capsulis conicis rostratis pilis rigidis inferne dense hirtis apice glabrescentibus fuscis, pedicello hirta nectarium duplo superante ; stylo producta ; stigmatibus integris ; foliis obovato-ovalibus utrinque glaberrimis subtus opacis margine acute glanduloso-serratis. — Hab. ad Hakodadi legerunt *Williams & Morrow*. (Hb. A. Gray.)

Arbor. Rami cortice fusco-glabro nitente obducti. Folia 1½ poll. longa, supra medium vix pollicem lata,

exacte obovata, apice recto nonnihil producta, margine acute serrata, serraturis subacutis glanduligeris, utrinque glaberrima, supra obscure viridia, venis elevatiusculis striata, subtus pallidiora subglaucescentia costa et venis prominulis, pulchre reticulato-venulosa: petiolus lineam longus, glaber. Amenta (foeminea tantum vidi) pollicaria, cylindrica, acutiuscula, densiflora, cinerascens, bracteis paucis et minutis suffulta; rhachis villosa-hirta: squamæ lineari-lanceolatae, obtusissimæ, concolores, ut videtur persistentes, capsulam fere dimidiam æquantibus: pedicellus parvus, nectarium crassissimum duplo superante, albo-hirtus. Capsulæ linea longiores, conico-rostratae, ventre pilis rigidis albis condensatis hirtis, rostro glabro fusco. Stylus productus pedicello longitudine, etiam glaber et fuscus: stigmata sat crassa, fulvescentia, integra.

A speciebus in Europa cognitis sat longe recedit, nec omnino certus sum an potissimum hanc maxime affinem credam. Quoad formam amentorum ut etiam foliorum *S. phyllicæfoliæ* quodammodo similis; capsulæ autem multo brevius pedicellatæ, basi albo-strigoræ, et *squamæ concolores*!

9. *SALIX VULPINA*, Anders. *sp. nov.*: diandra; amentis subsessilibus bracteatis; squamis acutis apice nigricantibus utrinque pilis rufis nitentibus dense hirtis; foliis obovatis oblique acutis serratis utrinque glabris subtus pallidioribus. — Hab. ad Yokuhama legerunt *Williams & Morrow*. (Hb. A. Gray.)

Frutex videtur sat altus. Rami mediocriter crassi, dense foliati, cortice fusco-castaneo nitenti obducti. Gemmæ $1\frac{1}{2}$ lin. longæ, etiam castaneæ glabræ nitentes. Folia subsessilia, petiolo brevissimo planiusculo glabrescente insidentia, juniora exacte obovata et minuta, præsertim subtus vellere tenui rufescenti-piloso et facile caduco obtuta, adulta fere pollicem longa, supra medium $\frac{3}{4}$ poll. lata, basi angustata, obovato-elliptica, apice parvo nonnihil producto sæpissime obliquo acutata, margine sat distincte profunde et æqualiter serrulata, supra obscure viridia costa albescente-puberula, ceterum glaberrima, venis regulariter arcuatis percursa, subtus pallidiora, costa et venis dilutioribus pulchre venulosis, omnino glabra, exsiccatione subnigrescentia. Amenta (mascula tantum vidi) $1\frac{1}{2}$ poll. longa, $2\frac{1}{2}$ lin. crassa, exacte cylindrica, obtusa, subflexuosa, erecto-patentia, densiflora, basi foliis parvis 3–4 suffulta: squamæ $\frac{1}{2}$ lin. longæ, ex ovata basi acutiusculæ, apice nigrescentes et subcalvescentes, ceterum utrinque pilis sat longis rufo-ferrugineis hirsutæ. Stamina gemina; filamentis squamas duplo superantibus pallide flavescentibus glabris superne crassioribus; antheris sat magnis rotundatis aurantiacis.

A speciebus omnibus mihi cognitis aperte recedit squamis capsularum rufo-hirtis. Quoad folia *S. nigricanti*, in Europa vulgatissimæ, certe proxima.

10. *SALIX ACUTIFOLIA*, Willd. *Spec.* 4. p. 688?

Ad hanc speciem non sine multa hæsitatione specimina quatuor parva et incompleta, ad Hakodadi Japoniæ a *Williams et Morrow* lecta (Hb. A. Gray), referre coactus sum. Rami cortice valde nitente castaneo obducti. Gemmæ maximæ, glabræ. Amenta mascula fere bipollicaria et 3–4 lin. crassa, densissime et hirsuta, arrecto-adpressa, e gemmis magnis erumpentibus, nullis foliis suffulta sed omnino sessilia: squamæ acutæ, atræ, pilis longis lucidis cinereo-flavicantibus obtectæ. Stamina gemina; filamentis longis pilos squamarum superantibus albis; antheris minutis rotundatis. Folia (novella tantum adsunt) lanceolata, crassiuscula et plana, integra vel obsoletissime serrulata, pure et lucide viridia.

N. J. ANDERSSON.

Holmiæ, d. 13. Feb., 1859.